



FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS



First Aero Weekly in the World.

Founder and Editor : STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 760. (No. 29, Vol. XV.)

JULY 19, 1923

[Weekly, Price 6d.
Post free, 7d.]

Flight

The Aircraft Engineer and Airships

Editorial Offices : 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2

Telegrams : Truditur, Westcent, London. Telephone : Gerrard 1828

Annual Subscription Rates, Post Free :

United Kingdom ... 30s. 4d. Abroad 33s. 0d.*

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates

* European subscriptions must be remitted in British currency

CONTENTS

	PAGE
Editorial Comment	
Britain at Gothenburg	391
Germany's Short-Sighted Policy	392
The King's Cup	393
R.A.F. Memorial	400
Western Australian Airways, Ltd.	401
The Gothenburg International Aero Exhibition. British Section :	
The Machines	402
The Engines	409
Other British Exhibits	413
Britain as an Air Power	415
Personals	415
Training R.A.F. Reserve Pilots : The De Havilland School	416
London Terminal Aerodrome	417
Air Ministry Notices	417
In Parliament	418
Royal Air Force	419
R.A.F. Intelligence	419
Society of Model Aeronautical Engineers	420

EDITORIAL COMMENT.



IN this week's issue of FLIGHT we publish illustrations and particulars of the machines, engines and other aircraft material to be exhibited at Gothenburg by British firms. The exhibition will be a thoroughly representative one from the British point of view, and although Air Ministry restrictions have deleted from the British section many interesting machines which some of our constructors would like to have exhibited, those that remain will still worthily represent modern, although not the very latest, British aircraft. It will be understood that, what with the difficulties arising out of the "secret" nature of certain new types, and the somewhat delicate task of selecting and agreeing upon the types to be represented, the Society of British Aircraft Constructors has not had an easy task. That agreement has, nevertheless, been reached is a matter for congratulation, and, as we have already said, taking into consideration the very many, and very great, difficulties that have had to be contended with, there is not much to find fault with in the selections made.

We could have wished to see British commercial aircraft represented at the exhibition. As it is, the machines shown are, without exception, military types. Whether this is due to the assumption, on the part of those making the selections, that the Scandinavian countries may be expected to purchase military machines, but not commercial ones, we have no means of knowing. We quite realise that, with a Government subsidy of limited amount, the number of exhibits financially possible was rather restricted, but we must confess a certain amount of disappointment that not a single British commercial machine will be on view. We trust, however, that a fair number of machines of this type will take part in, or at any rate be present at, the flying competitions, etc., to be held concurrently with the latter part of the exhibition. In an article published in FLIGHT on June 14, 1923, we gave particulars of the flying competitions to be held at Gothenburg from August 3 to August 10, and it is there pointed out that, what with substantial prizes offered for the arrival competition and the premium of 1 Swedish krona per kilometre

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :—

- July 20 Gothenburg Exhibition
- Aug. 1 Entries close from British Competitors for Schneider Cup
- Aug. 3-14 Rhön Gliding Competition
- Aug. 6 Aerial Derby, Hendon
- Aug. 6-27 French Gliding Competition, near Cherbourg
- Aug. 8-12 F.I.A. Conference, Gothenburg.
- Sept. 23 ... Gordon Bennett Balloon Race, Belgium
- Sept. 28 ... Schneider Cup Seaplane Race at Cowes
- Oct. 8-13 Light 'Plane and Glider Competitions, Lympne
- Oct. 14 Beaumont Cup Race at Istres, France
- Dec. 1 Entries close for French Aero Engine Competition

1924

- Mar. 1 French Aero Engine Competition.

flown from the starting-point to Gothenburg, there is a possibility of earning quite a considerable amount by flying British machines to the exhibition aerodrome, apart from any prizes that may be won at the competitions themselves afterwards. Thus, not only from the point of view of propaganda, but also commercially, it should be well worth while to send British civilian aircraft to Gothenburg for the flying week there. As particulars were published in the issue referred to above, there is no need to do more at present than offer a reminder of these competitions, and express the hope that the absence of British commercial aircraft within the exhibition at Gothenburg will be counteracted by a representative participation, during the last week of the show, in the various flying competitions. At the moment of writing no very definite information is available, but certainly some of the well-known British types, such as the D.H.34 and the Handley Page W. 8B, should be represented, and it is sincerely to be hoped that more recent machines, such as the new De Havilland four-seater taxiplane, the Supermarine "Sea Eagle" amphibian flying boat and the new Vickers "Vanguard" 25-seater, may represent British civilian aviation at Gothenburg.

Germany's Short-Sighted Policy

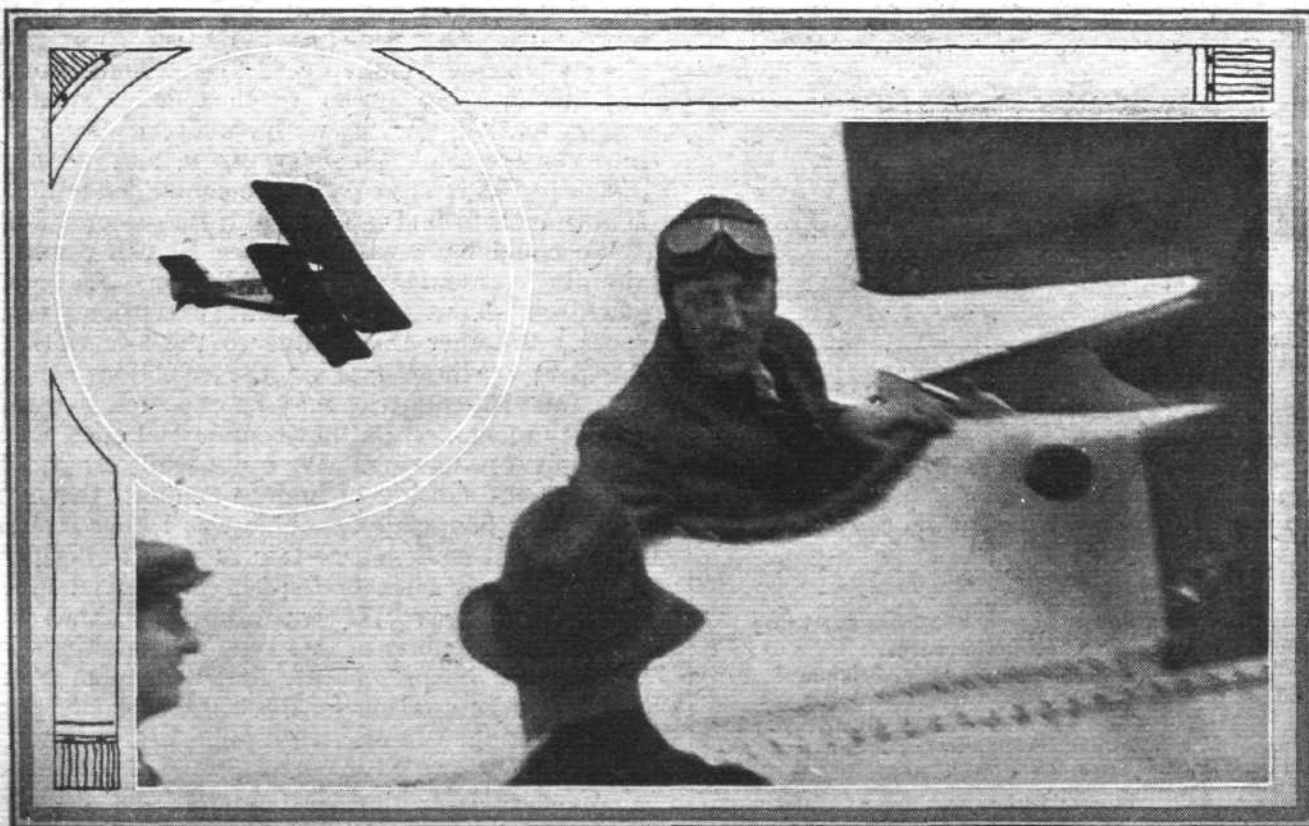
It is difficult to see what purpose is served by the decision of Germany to prohibit French aviators flying over Germany while making their way to the Gothenburg Exhibition. Even if the purpose of this edict was to annoy France, one would imagine that any effect in that direction would be more than counterbalanced by the indignation which has been aroused in Sweden by this going back, at the last moment, on an arrangement made months ago. The only conclusion possible is that this move is but one more of those mysterious and inexplicable excursions which are such a characteristic feature of German diplomacy, and which appear to be solely designed to annoy her friends. Fortunately it will not make a very great deal of difference to those concerned, a slight detour over Belgium, Holland and Denmark adding a little to the distance to be flown, but any inconvenience occasioned thereby will probably be more than made up for by the increased amount of publicity obtained. Moreover, so as to neutralise this spiteful action by Germany, it may be possible for the Gothenburg authorities to vary the "straight line" condition for the Krona-kilometre premium, to the most direct "possible" route.



at the

GOTHENBURG INTERNATIONAL AERO EXHIBITION.

"FLIGHT" will be on sale at the Gothenburg Aero Exhibition at
 "THE DAILY TELEGRAPH" KIOSK, in Main Entrance,
 where Exhibition communications can also be addressed.



THE KING'S CUP : Mr. Courtney preparing to dismount immediately after his victory. Inset, the Siddeley "Siskin" crossing the line.



THE TWO SIDDELEY "JAGUAR"-ENGINEED MACHINES READY TO GET AWAY: Left, the Gloucestershire "Grebe," the scratch machine, and, right, Mr. J. D. Siddeley's "Siskin," which was piloted to victory by Mr. Frank T. Courtney.

THE Second Circuit of Britain Handicap Race, for the Cup presented by H.M. The King, which was flown on Friday and Saturday last, was a decidedly interesting one, full of incident and, fortunately, free from serious accident. It was chiefly remarkable for the splendid performance of the winner, F. T. Courtney, whose Siddeley-Jaguar-Siskin, entered by Mr. J. D. Siddeley, completed the odd 800 miles in the extraordinary time of 5 hours 25 mins. 27 secs., or at a speed of nearly 150 m.p.h. Another outstanding feature of the race was the winning of second and third places respectively by Mr. George Robey's Napier "Lion"-engined D.H.9, piloted by Alan J. Cobham, and Mr. Harry Tate's Siddeley "Puma"-engined D.H.9c, piloted by Capt. H. S. Broad. These were both popular wins, Cobham's performance being distinctly noteworthy—he was only ten minutes behind Courtney at the finish.

In last year's race exactly half the number of starters completed the full course, and by a strange coincidence the same has happened again this year. Out of 14 starters from Hendon (there were three last-minute non-starters) seven officially crossed the finishing line. Of these 14, 11 completed the first stage, and nine of these started on the second stage. The reasons for the various retirements were in every case of a trivial, and therefore very annoying, nature, with the result that there was much disappointment, amongst competitors and lookers-on alike, in certain entries not getting through. For instance, everyone wished to see that thoroughly good sport, F. P. Raynham, have a chance of obtaining a place at the finish—but there, his ill-luck seems to follow him always on these occasions. Again, it was indeed a pity that the only amphibian in the race, the Supermarine "Sea Eagle," could not complete the course, and show us what this type of



Handing over the King's Cup by the Duke of Sutherland to Mr. J. D. Siddeley: On the left and extreme right respectively, Mr. and Mrs. Frank T. Courtney.

machine really *can* do, for until it was officially placed "out of the flying" through one of those irritating mishaps—referred to in detail later—it was putting up a splendid performance. Having thus preambled, we will now proceed to report the progress of the race from start to finish. For the times, etc., of the competitors we would draw our readers' attention to the tables appearing on p. 395.

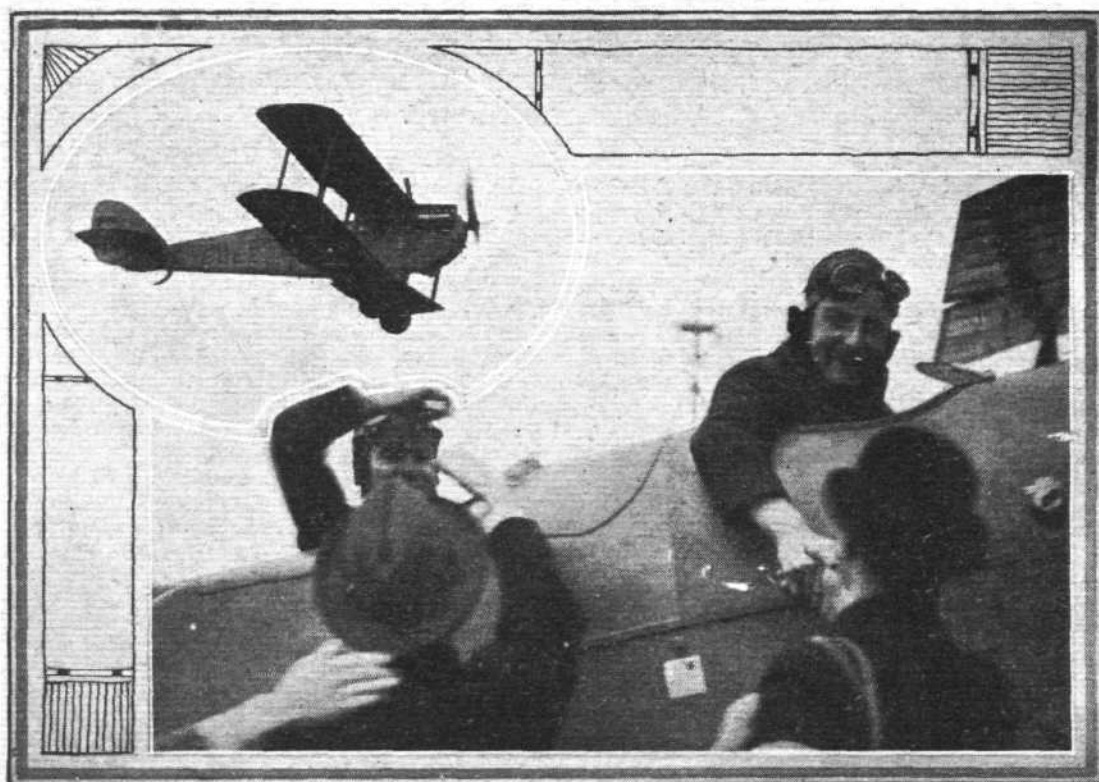
The Start at Hendon

In many ways the start for this year's King's Cup Race was an improvement on last year's. For one thing, it did not take place quite so early in the morning, while the summery conditions prevailing and the pleasant, familiar, surroundings of Hendon were much more acceptable than the cold reception experienced last September at Croydon.

Not very many people turned up at the aerodrome to see the start on Friday—just a few hundred, and many of these were friends of those directly, or indirectly, connected with the race. There were, however, many well-known faces to be seen among those present, including Major-General Sir Sefton Brancker—as full of aeronautical energy as ever—who, with Lieut.-Col. L. F. Blandy and Colonel F. Lindsay Lloyd, officiated as steward; Brig.-General Sir Capel Holden (who acted as Judge); Air Vice-Marshal Sir William Salmond,

At 10 o'clock-Emma precisely George Reynolds dropped his flag, and the first man, Lieut. W. H. Longton on the Sopwith "Gnu," started off for Birmingham, F. L. Robinson on the Boulton and Paul P.9 following him 43 seconds later. The next away, 43 seconds later, was H. C. Biard on the Supermarine "Sea Eagle" amphibian. This comparatively large machine carried four passengers besides the pilot, which no doubt accounted for the fact that it did not take off as quickly as the other machines did.

After an interval of about half an hour F. P. Raynham left on his Martinsyde F.6, still yellow and looking neater and speedier than ever—the Martinsyde, that is, not Raynham. In less than a minute C. D. Barnard was sent off on the D.H.9c, with its entrant, Princess Lowenstein Wertheim, suitably attired in leather flying kit, as passenger. Harry Tate's D.H.9c, piloted by H. S. Broad, followed some five minutes later—the air seemed thick with D.H.'s just at this time! A. F. Muir, on the Surrey Flying Services D.H.9, also with a passenger, was next away, and two minutes later S. Cockerell made a splendid take-off on the Vickers "Vulcan." Another D.H., Lieut.-Col. Darby's "A.D.C." 9A, with Rolls-Royce "Eagle" engine, piloted by R. H. Stocken, followed eight minutes later. "Bettine" was well out of sight before A. S. Butler's D.H.37—the graceful lines of this machine were much



THE KING'S CUP: Mr. A. J. Cobham being congratulated on having secured second place. Inset, the Napier "Lion"-engined D.H.9 passing over the winning line.

etc. Of course, most of the entrants were to be seen having a final look over their entries, prominent amongst these being Sir Samuel Instone, Lieut.-Col. F. K. McClean, Mr. George Robey and Mr. Harry Tate—the two latter "stars" looking very proud and hopeful of their mounts and jockeys. Mention must also be made of "Long Tom," who now must be looked upon as "the" Aero Bookie. Weather conditions were very nice, there being a clear sky and a light south-westerly wind. It is true that as the morning advanced the heat became rather trying, both to competitors and spectators, and visibility was poor in places owing to the haze.

By 10 o'clock all was ready for the start, the first half-dozen machines having been lined up in good time and with noteworthy absence of "bustle." Three non-starters were announced, as follows: Bert Hinkler and the Avro "Viper," G. Powell (D.H.34), and H. H. Perry (D.H.9A with Napier "Lion"). The Avro "Viper," it appears, had received certain alterations after the handicaps had been announced, and was thus disqualified. Powell's D.H.34 could not be spared from its official duties on the London-Continental air service, and Perry's mount had, the evening before, stood on its nose whilst being "man-handled," and thus broke its propeller—another one suitable for use with the "Lion" could not be obtained in time.

admired—piloted by H. Hemming, got away, and not without incident, for he had to dodge several photographers who were out on the 'drome in the path of the machine.

Last year's winner, F. L. Barnard, on the Instone D.H.4A "City of York," with two passengers looking rather hot in the cabin, got away next, and after a wait of nearly 20 minutes the last three were despatched in quick succession. These were George Robey's D.H.9—"Lion," piloted by A. J. Cobham, F. T. Courtney on the Siddeley "Siskin," and L. L. Carter on the Gloucestershire "Grebe." The last two, both fitted with Siddeley "Jaguars" started within a few seconds of each other, Courtney getting off with a spectacular climbing turn, and Carter "zooming" in fine style. As soon as the last machines were out of sight everyone departed and Hendon settled down to a normal but perspiring condition.

At the Controls

Hendon-Birmingham (91 miles)

ALTHOUGH it was a perfect summer's day, comparatively few people turned-up at Castle Bromwich aerodrome to witness the arrival and departure of the King's Cup competitors. The Lord Mayor (Sir David Davis) and the Lady Mayoress were among the many prominent Birmingham citizens who motored over to see the fun. A fairly thick haze



THE KING'S CUP: The Siddeley "Siskin," Courtney's winning mount, "on view" after the race.

PROGRESS OF FLIGHT. (As Received by Air Ministry Wireless)

OUTWARD

Order of Start.	Regn. Mark.	Machine.	Pilot.	Time Allowance. Out.	Hendon-Birmingham.		Birmingham-Newcastle.		Newcastle-Glasgow.		Net Flying Time.	Position.
					Depart.	Arrive.	Depart.	Arrive.	Depart.	Arrive.		
1	G-EAGP ..	Sopwith Gnu ..	W. H. Longton	1 34 29	10 0 0	10 54 28	12 24 28	14 34 48	16 4 48	17 24 31	4 24 31	8
2	G-EAWS ..	Boult.-Paul P.9	F. L. Robinson	1 33 46	10 0 43	10 55 17	12 25 17	Down near Burton.				
3	G-EBFK ..	Sup. Sea Eagle	H. C. Biard ..	1 33 31	10 1 26	10 54 49	12 24 49	14 23 14	15 53 14	17 15 9	4 13 53	7
4	G-EAPR ..	Avro Viper ..	B. Hinkler ..	0 58 41	10 35 48	Disqualified.						
5	G-EBDK ..	Martinsyde F.6	F. P. Raynham	0 55 32	10 38 57	11 20 08	12 50 8	Down near Leeds.				
6	G-EBDD ..	D.H.9c ..	C. D. Barnard	0 55 11	10 39 28	11 30 50	13 0 50	14 53 55	16 33 55	17 33 32	3 54 4	10
7	G-EBGT ..	D.9c ..	H. S. Broad ..	0 49 31	10 44 58	11 30 19	13 0 19	14 37 6	16 7 6	17 11 8	3 26 10	5
8	G-EBBW ..	D.H.34 ..	G. Powell ..	0 47 34	10 46 55	Non-starter.						
9	G-EBEP ..	D.H.9 ..	A. F. Muir ..	0 45 40	10 48 49	11 35 19	13 5 19	14 47 55	16 17 55	17 25 56	3 37 7	9
10	G-EBFC ..	Vickers Vulcan	S. Cockerell ..	0 43 20	10 51 9	11 35 32	Retired	Birmingham.				
11	G-EBCG ..	D.H.9a ..	R. H. Stocken	0 34 57	10 59 32	11 39 35	13 9 45	14 57 12	16 27 12	17 40 23	3 40 51	11
12	G-EBDO ..	D.H.37 ..	H. Hemming	0 29 59	11 4 30	11 46 35	13 16 35	14 42 14	16 12 4	17 15 2	3 10 32	6
13	G-EAMU ..	D.H.4a ..	F. L. Barnard	0 20 46	11 13 43	11 52 47	13 22 47	14 50 6	16 20 6	17 7 31	3 3 48	3
14	G-EBGX ..	D.H.9a ..	H. H. Perry ..	0 3 32	11 30 57	Non-starter.						
15	G-EBEZ ..	D.H.9 ..	A. J. Cobham	0 1 10	11 33 19	12 7 7	13 37 14	14 47 43	16 17 43	17 8 30	2 35 11	4
16	G-EBEU ..	Siddeley Siskin	F. T. Courtney	0 0 18	11 34 11	12 6 37	13 36 7	14 42 32	16 12 32	17 3 23	2 29 12	1
17	G-EBHA ..	Glouces. Grebe	L. L. Carter ..	Scratch	11 34 29	12 7 9	13 37 9	14 44 29	16 14 29	17 6 45	2 32 19	2

HOMEWARD

Order of start.	Regn. Mark.	Pilot.	Time Allowance. Home.	Glasgow, Depart.	Manchester, Arrive.	Manchester, Depart.	Bristol, Arrive.	Bristol, Depart.	Hendon, Arrive.	Net Flying Time.	Total Net Flying Time.	Position.
1	G-EAGP ..	W. H. Longton	1 43 1	9 7 49	11 33 56	13 3 56	15 2 3	16 32 3	17 48 23	5 40 34	10 5 5	7
2	G-EAWS ..	F. L. Robinson	1 42 14									
3	G-EBFK ..	H. C. Biard ..	1 41 28	Disqualified.								
4	G-EAPR ..	B. Hinkler ..	1 3 59									
5	G-EBDK ..	F. P. Raynham	1 0 33									
6	G-EBDD ..	C. D. Barnard	0 59 59	9 59 52	12 8 29	Disqualified.						
7	G-EBGT ..	H. S. Broad ..	0 53 59	9 43 28	11 31 23	13 1 23	14 16 8	15 46 8	16 38 17	3 54 49	7 20 59	3
8	G-EBBW ..	G. Powell ..	0 51 52									
9	G-EBEP ..	A. F. Muir ..	0 49 47	10 4 28	12 19 34	13 49 34	15 14 25	16 44 25	17 44 22	4 39 54	8 17 1	6
10	G-EBFC ..	S. Cockerell ..	0 47 15									
11	G-EBCG ..	R. H. Stocken	0 38 6	Retired.								
12	G-EBDO ..	H. Hemming	0 32 41	10 8 40	11 50 32	13 20 32	14 29 49	15 59 49	16 48 54	3 40 14	6 50 46	5
13	G-EAMU ..	F. L. Barnard	0 22 38	10 21 12	11 53 42	13 23 42	14 27 45	15 57 45	16 44 8	3 26 56	6 30 44	4
14	G-EBGX ..	H. H. Perry ..	0 3 50									
15	G-EBEZ ..	A. J. Cobham	0 1 15	10 33 34	11 54 29	13 24 29	14 23 36	15 53 36	16 33 48	3 0 14	5 36 25	2
16	G-EBEU ..	F. T. Courtney	0 0 18	10 29 24	11 49 8	13 19 8	14 16 0	15 46 0	16 25 39	2 56 15	5 25 27	1
17	G-EBHA ..	L. L. Carter ..	Scratch	12 33 4	11 52 25							

Prizes.—In addition to the King's Cup the following subsidiary prizes were won by F. T. Courtney:—*Daily Telegraph*, £100, for fastest time for complete circuit. Invernairn Cup (£50) for first arrival at Glasgow. Bristol Aeroplane Company, £50; Corporation of Glasgow, £40; *Newcastle Chronicle*, £25; Bristol Rotary Club, 20 guineas; Bristol Constitutional Club, Cup (20 guineas); for fastest handicap times on intermediate stages.

A. J. Cobham:—Sir Charles Wakefield, £100, for second to complete the circuit.

L. L. Carter:—*Manchester Guardian*, £25, for fastest handicap time between Glasgow-Manchester.

hung over the aerodrome, and when the first machine arrived it was heard some time before it was seen. The first arrival was Longton, who crossed the line at 10.54.28, the hum of a second machine being heard at the same time. This proved to be Biard, who landed only 21 seconds later. Before he did so, however, the third man appeared in Robinson, on the Boulton and Paul P.9. He "crossed" about half a minute later.

Raynham arrived next after an interval of about half an hour later, and created somewhat of an impression when he stepped out of his machine attired in white flannel trousers! A few minutes later Broad arrived, with C. D. Barnard and his royal passenger, only a few seconds behind. Five minutes later Muir came in, having just overhauled Cockerell, who landed immediately after. Cockerell reported that he noticed something wrong just outside the aerodrome, and he therefore slowed down his pace. On inspection it was found that the fabric of the centre section was stripping, and as this could not be properly repaired on the spot Cockerell was forced to retire.

After this Stocken came along, and a few minutes later Hemming. The next in was F. L. Barnard on G-EAMU, and then a little later on the last three, and fastest, machines arrived. The first of these was Courtney, who got in front of Cobham by 30 seconds, whilst Carter followed only two seconds behind Cobham. The fastest time for this section was made by Courtney, who covered the 91 miles in 32 mins. 26 secs., Carter being next with 32 mins. 40 secs.

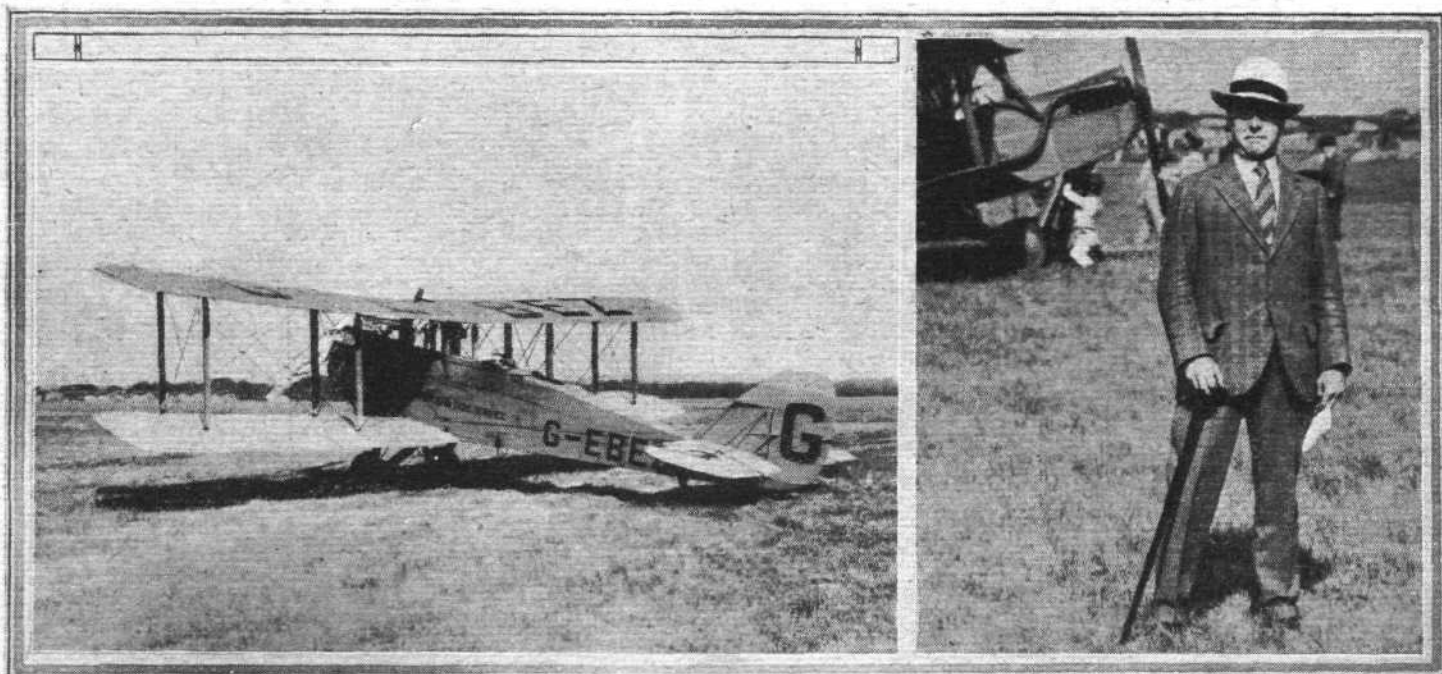
In the meantime the other competitors were coming in. The second to arrive was Longton, about five minutes after Biard, and following two minutes behind Longton came Broad on Harry Tate's D.H.9c. Robinson failed to turn up, and it was found out later that he had made a forced landing near Burton-on-Trent, and was unable to continue.

At 2.42 came a little excitement, when Major Hemming arrived on the D.H.37, with Courtney rapidly overhauling him. Hemming, however, managed to cross the line 14 secs. ahead. After this machines came in in rapid succession—Cobham and Muir almost neck and neck, then the two "Barnyards" (F. L. leading) and Stocken, all three arriving within a few minutes.

Thus, of the 14 machines which started from Hendon, 11 now remained—all of which left in good order for the last section of the first stage.

Newcastle-Glasgow (125 miles)

EXTREME liveliness prevailed at Renfrew, where enormous crowds gathered—both in the aerodrome and round about—to witness the finish of the first stage of the King's Cup Race. In contrast to last year's wintry conditions, fine sunshiny weather rendered the proceedings extremely pleasant. Whilst waiting for the arrival of the competitors the spectators were kept amused with some fine exhibition flying by a formation of aeroplanes from the R.A.F. station at Leuchars. Some excitement was also provided on the arrival of the R.A.F. machines, by one of them "wiping" off his undercarriage when landing. In the crash which resulted, fortunately only



THE KING'S CUP: Mr. George Robey's D.H.9 before the start, and, on the right, "George" with the smile that will not come off.

Birmingham-Newcastle (171 miles)

LARGE crowds of spectators assembled on Town Moor aerodrome, where weather conditions were ideal from the point of view of those on the ground. For the competitors there was a slight head wind and a light haze rendered visibility none too good.

It had been calculated that the first machine would reach Town Moor shortly before 2.30 p.m., and, sure enough, at 2 hours 23 mins. 14 secs. in came Biard on the Supermarine "Sea Eagle," being rather surprised to learn on landing that he was the first one in, as he said Raynham had passed him some way back. Raynham, it appeared, however, broke a bracing wire near Leeds and had to descend. He was unable to effect a repair in accordance with the rules, and so had to retire from the race. Later on, however, he obtained a new wire, and flew on to Manchester, there to await his more fortunate rivals.

Biard, also, started his troubles, for whilst certain adjustments were being carried out during the compulsory stop of 1½ hours at Newcastle, one of the tyres burst owing to the heat from the sun. Unfortunately, Biard had discarded the spare wheel at Birmingham, in order to reduce weight, and there was not time to effect a repair, so it was finally decided to deflate the other tyre and continue on the rims.

the machine suffered damage. A musical programme was also provided.

The arrival of the competitors was thrilling indeed, for all of the 11 machines which started from Newcastle crossed the line in rapid succession, only 37 minutes separating the first and last machines. In this last section, Courtney improved somewhat on his position, and crossed the line at 5 hours 3 mins. 23 secs., having covered the last 125 miles in 51 mins. He naturally received a tremendous ovation on landing, and cheering was still in progress when the second man hove into sight. This was Carter, on the Gloucestershire "Grebe," who was 3 mins. 22 secs. behind. Thus, the two air-cooled Siddeley "Jaguars" came through the first stage of the race with flying colours.

Two minutes after Carter "finished," Cobham on George Robey's D.H. "Lion" crossed the line, having crept slowly but surely ahead. The "Very 'ot Tater 'plane" came in next, 2½ minutes later, and on landing the pilot was seen to have a "Broad" smile upon his face. About 4 minutes later Biard came in, but failed at first to cross the line correctly, with the result that Hemming, who was close behind, got into fifth place 7 secs. before him. Biard, it will be remembered, was minus tyres, but nevertheless managed to make a safe landing. In doing so, however, the wheels were slightly

damaged, and it may be mentioned here that as he replaced these later with new wheels obtained "from outside" he was officially placed out of the race.

F. L. Barnard, on the veteran D.H.4A, came in seventh, some 2 minutes after Biard, and then, after an interval of about 7 minutes, Longton arrived, followed 3 minutes later by Muir. The "flying Princess," piloted by C. D. Barnard, came in tenth after an interval of 5 minutes, and 7 minutes behind the eleventh and last competitor, Stocken, arrived.

All now being in, a pleasant little ceremony took place, when Courtney was presented with the Invernairn Cup by

Glasgow-Manchester (189 miles)

THE number of spectators at Alexandra Park aerodrome was not so large this year as on the previous occasion, and for the greater part was made up of people more or less directly connected with aviation. There was, however, a goodly crowd outside!

Of the 10 starters from Glasgow, nine arrived at Manchester, all within the space of 48 minutes. The first to arrive was Broad, who was making splendid progress, having passed Longton just outside Manchester. When Longton, who came in two minutes later, landed, it was found that the ball racecage



THE KING'S CUP : Capt. H. S. Broad, who secured third place, gets away on D.H.9c (230 Siddeley "Puma"), the machine entered by Harry Tate.

Mrs. Stewart (Lord Invernairn's niece), and the Glasgow Corporation £40 prize by Bailie Izett. Courtney's net flying time for the 387 miles between London and Glasgow was 2 hours 29 mins. 12 secs.—an average speed of nearly 155 m.p.h.

The start for the second stage of the race, Manchester-Bristol-Hendon, took place early on Saturday morning. At first the weather promised to be fine, but soon the sky became overcast with fairly low clouds and a 10-mile north-east wind blew up. However, conditions were none too bad, and visibility was reported to be fair. Nothing like so many people turned up to see the start from the aerodrome, but outside and round about large crowds gathered to see the machines fly over. The times for the departure of the competitors, according to their handicaps and times gained or lost on the

of the "Gnu's" "Le Rhone" was broken. In consequence Longton had to give up ideas of lunch and set to work in putting matters aright—which he did only just in time.

About 16 minutes later, much to everybody's delight, Courtney's "Siskin" hurtled across the line—1 hour 19 mins. 44 secs. after leaving Glasgow. He had experienced slight petrol trouble, and on landing immediately set to work in locating the trouble—result, another lunch untouched. The lighter load obtained thereby appeared to produce good effect, judging by the way the "Siskin" took off when he resumed his journey 90 minutes later!

The fourth man in was Hemming, with Carter fifth 2 minutes behind. Carter had made good on this section, beating Courtney's time for the 189 miles by 23 seconds, and it was



THE KING'S CUP : First to start, Lieut.-Col. F. K. McClean's Sopwith "Gnu," flown by Flight-Lieut. W. H. Longton.

first stage, had been worked out over-night, and with the exception of Stocken, who had trouble with his carburettor which could not be remedied in time for him to get away, all started off without incident.

The first to leave, at 9 o'clock sharp, was Biard, in spite of the fact that he was disqualified. He was determined, however, to make an effort to get round nevertheless. The others followed in the following order: Longton, Broad, C. D. Barnard, Muir, Hemming, F. L. Barnard, Courtney, Carter, and Cobham.

a thousand pities, therefore, that a broken landing wire (this gave way shortly after leaving Glasgow) should necessitate his retirement from the race. F. L. Barnard arrived sixth, one minute after Carter and one minute in front of Cobham, who came in seventh.

The last two to arrive were C. D. Barnard and Muir, with 11 minutes separating each other. The former failed to cross the line correctly, and was subsequently disqualified.

Thus, only half the total number of original starters left Manchester for Bristol.

Manchester-Bristol (133 miles)

ALTHOUGH there was a fair attendance at Filton, it was not as large as that on the occasion of the Grosvenor Cup last month. Those who did turn up, however, experienced plenty of excitement, for apart from "local" amusement in the form of exhibition and passenger flights by T. W. Campbell and C. F. Uwins in "Bristol" machines and Capt. Macmillan in a Parnall "Plover," the competitors in the great race, when they did come in, all came in fairly close together.

from the scraps of conversation overheard from those present, the "gate" was composed mainly of full-blooded aviation enthusiasts. Croydon enclosures, at last year's race, presented a much more animated and crowded appearance.

Waiting for the arrival of the competitors was by no means a dull occupation, for two "Nighthawks," in the charge of Flight-Lieut. Bulman and Flying Officer Chick—of R.A.F. Pageant fame—were there to give us some exceptionally fine exhibition flying. Sundry D.H. machines, presumably



KCR 1923 11
THE KING'S CUP : Three interesting machines at Hendon for the start. Left to right, Mr. Alan S. Butler's D.H.37 (275 Rolls-Royce "Falcon 3"), flown by Major H. Hemming; Mr. F. P. Raynham's Martinsyde F.6 (700 Wolseley "Viper"), piloted by himself; Mr. Douglas Vicker's Vickers "Vulcan" (450 Napier "Lion"), flown by Capt. S. Cockerell.

Courtney, still leading, came in at 2.16, with Broad only 8 seconds behind. Cobham, with "Eileen" going strong, came along after an interval of about 7 minutes. Then, 4 minutes later, F. L. Barnard arrived fourth, 2 minutes in front of Hemming. There was an interval of about half an hour before Longton crossed the line, and another 12½ minutes separated him from the last man in, Muir.

All seven competitors eventually started on the last lap of the race.

from the Stag Lane aerodrome close by, were also hovering about, whilst Raynham came in during the afternoon on his yellow Martinsyde, and before landing he gave us one or two evolutions in the air, displaying the graceful flying qualities of this splendid machine. C. D. Barnard also arrived back from Manchester in the D.H.9c, with Princess Lowenstein-Wertheim.

At about 3.45 it was announced that Courtney and Broad had left Bristol, and as this meant the time was drawing near



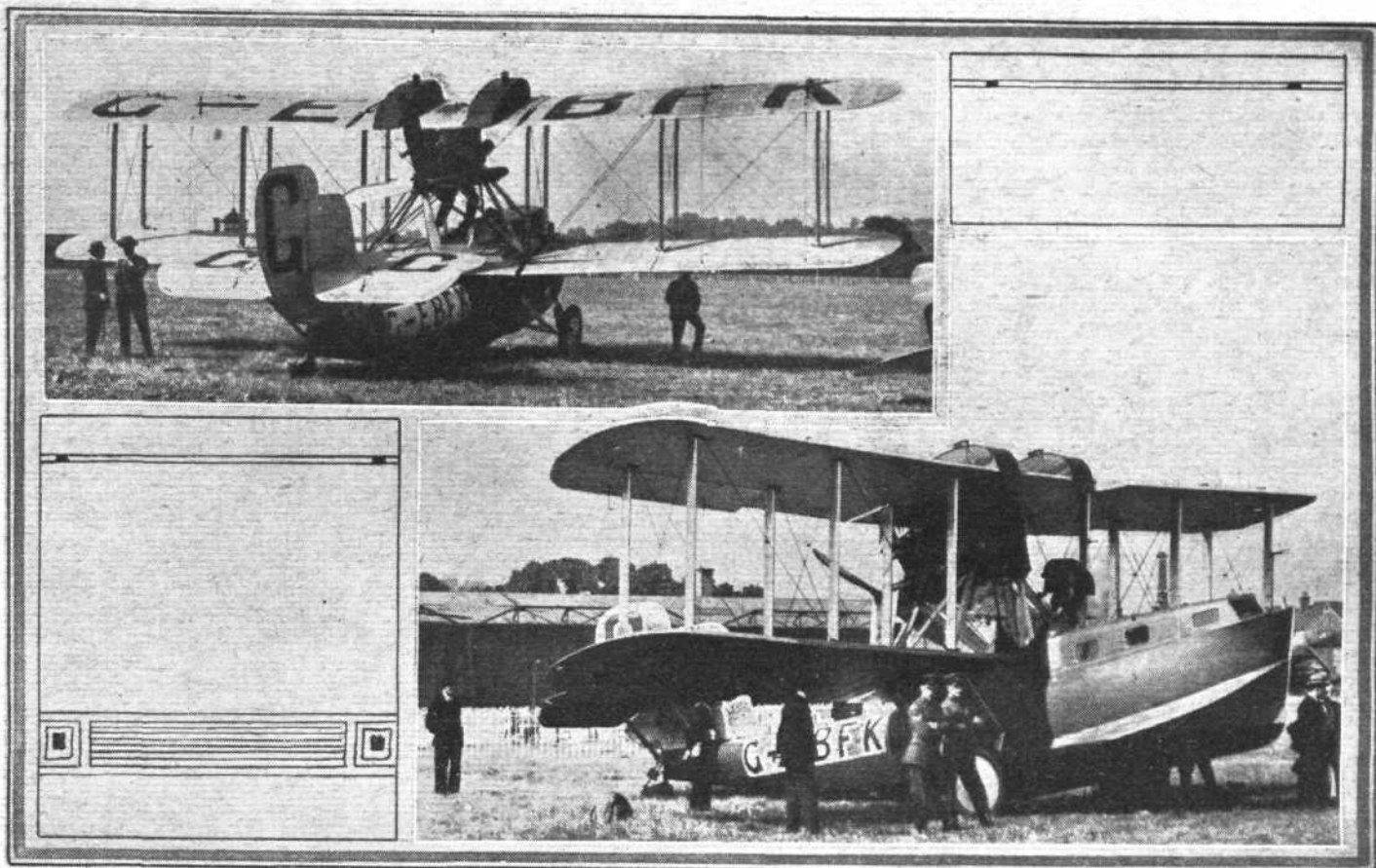
THE KING'S CUP : The last three away. From right to left, Mr. George Robey's D.H.9 (450 Napier "Lion"), flown by Mr. A. J. Cobham, who came in second; Mr. J. D. Siddeley's Siddeley "Siskin" (325 Siddeley "Jaguar"), piloted by Mr. Frank T. Courtney, in whom was found the winner; Sir William Joynson-Hicks' Gloucestershire "Grebe" (325 Siddeley "Jaguar"), flown by Mr. L. L. Carter. This entry was the scratch machine.

The Finish—Bristol-Hendon (100 miles)

COMPARED with the enthusiasm displayed at the other controls, the finish at Hendon was a rather tame affair. Only a few hundred people turned up, in spite of the fact that the weather was delightfully cool and that there were no other big attractions to keep the crowds away. The "general public," in fact, was far from being in evidence, for, judging

for their arrival at Hendon, the various officials began to bustle and take up their positions. In the meantime the Duke of Sutherland arrived, and took up a good vantage point by the Judge's table. Here ensued an enthusiastic conversation as to the possible winners, their times over the various sections, etc.

Then, just as it was nearing half-past four, the purr of the



THE KING'S CUP : Mr. Hubert Scott-Paine's Supermarine "Sea Eagle" (360 Rolls-Royce "Eagle IX"), piloted by Capt. H. C. Biard. This fine craft, which flew so splendidly, had to suffer penalties through tyre trouble.

"Jaguar" was heard, and in came Courtney, fairly high at first, but descending to the necessary 500 ft. as he crossed the line, to the accompaniment of loud cheers, at 4 hours. 25 mins. 39 secs.

He no sooner landed than there was a rush for his machine, and he had to go through the usual ordeal of hearty handshakes, congratulations, and "look-this-ways" from umpteen different photographers. Eventually he was carried off in triumph to a place of necessary rest and refreshment.

Just at this moment another machine came into view, and, with a squawk of delight from George Robey, Cobham thundered past the line at 4 hours 33 mins. 48 secs., 8 minutes after Courtney. This was obviously a popular arrival, judging from the applause, and the first to shake Cobham's and his passenger's hands was the happy entrant.

The photographers and others were still hard at it when the third man arrived. This was another D.H., which as it flashed past the line (time, 4 hours 38 mins. 17 secs.) was seen to be Harry Tate's 9c, piloted by Broad. He, also, was accorded a hearty reception, and the personal congratulations of Harry.

Courtney stated that both machine and engine behaved splendidly throughout the race, and he only experienced slight petrol trouble. He had run the engine all out all the way and it never failed once. On approaching Bristol, over the Forest of Dean, he had to climb to 8,000 ft. in order to get above the clouds, but otherwise the weather conditions were favourable.

The fitting of a "Lion" in Cobham's D.H.9 was in every way a success, and his progress throughout the race was exceptionally good—his average speed for the full course being 144.7 m.p.h., which is certainly remarkable for this type of machine.

Broad reported that he had to fly most of the way at 300 ft. in order to keep below the clouds, which must have meant considerable strain, and when it is remembered that his 'bus was only fitted with a 240 Siddeley "Puma" against the two higher-powered engines in his rivals' machines, his performance is all the more noteworthy.

At 4.44 F. L. Barnard on the D.H.4A "City of York"—last year's winner—came in fourth, and Sir Samuel Instone complimented him on his effort, remarking, "Well, you can't win every time." The fifth man in was Hemming, on A. S. Butler's D.H.37, his time of arrival being 4 hours 48 mins. 54 secs. Thanks to the excellent navigating of his passenger,

Capt. Tymus, he said that he had a very easy time of it throughout the race.

The Duke of Sutherland then presented the King's Cup to Mr. J. D. Siddeley, and in doing so he said the race had been valuable not only from the sporting point of view, but from that of utility. It was, he said, a magnificent idea of the King to present a cup for this race. This day had seen the triumph of the air-cooled engine, and all were pleased to see Mr. Siddeley and Mr. Courtney the winners.

They were also pleased to see the successful efforts on the part of the two members of the theatrical profession, Mr. Robey and Mr. Tate. He further added, that on behalf of aero-engine constructors he wished to assure Mr. Tate that these engines would not give the trouble which Mr. Tate appeared to experience with a certain "car" engine.

It was not until nearly an hour after Hemming had got back that the sixth man, Muir, arrived, and 4 minutes later Longton completed the list of arrivals.

KING'S CUP ITEMS

The King's Congratulations

THE Royal Aero Club received the following telegram from the King:

"Please convey to Mr. Courtney His Majesty's sincere congratulations on winning the King's Cup.

Aids to Success

WHEN considering the result of such an important event as the King's Cup Race it is important to give a thought to the various things which aid the winning machine to secure its victory. Foremost comes the question of fuel, and here honours were scored by the Shell-Mex Company.

Almost equally important is the matter of lubrication, and in this respect Messrs. C. C. Wakefield and Co., Ltd., added to their tale of successes, as Castrol was used not only by Mr. Frank T. Courtney, the winner, but also by Mr. A. J. Cobham, who was second. It may be recalled that the winner and second in last year's race were Castrol-lubricated, so have been every winner in the seven Aerial Derby races, while this famous oil has played its part in the making of every British air record since 1909.

The winning Siddeley-Siskin was doped with Cellon—a fact which should be noted by those who have set their heart on winning speed events.

Another item which should be recorded is that the first three machines were equipped with Smith's instruments and K.L.G. plugs.

R.A.F. MEMORIAL

THE Prince of Wales on Monday unveiled the R.A.F. War Memorial at Whitehall Stairs, on the Victoria Embankment, in the presence of a large crowd and a distinguished company, representative of the three Services and the Air Ministry.

The memorial, as will be seen from our photograph, consists of a pylon of the same stone as that of the Cenotaph, with a bronze globe at the summit surmounted by a golden eagle, which faces out over the river with uplifted wings as if on the point of flight. Under the badge of the Royal Air Force, carved in low relief, and on the frieze below the main cornice, is the motto of the Force, "Per ardua ad astra." Below, facing the Embankment, is the inscription in gold:—

"In memory of all ranks of the Royal Naval Air Service, the Royal Flying Corps, the Royal Air Force, and those Air Forces from every part of the British Empire who gave their lives in winning victory for their King and country, 1914-1918.

"I bare you on Eagles' Wings and brought you unto myself."

On the rear panel facing the Thames is the simple inscription:—

"In perpetual memory, 1914-1918."

The memorial is the work of Sir Reginald Blomfield, R.A., and Mr. Reid Dick, A.R.A., and is a fine interpretation of the spirit of the Air Force.

Ten minutes after the arrival of the Duke of York, in the

uniform of the Air Force, the Prince of Wales was heartily greeted by the assembly, and almost at once proceeded to inspect the Guard of Honour, under Wing Commander C. D. Breese. The architect, Sir Reginald Blomfield, R.A., Mr. Reid Dick, A.R.A., the sculptor, a Director of Messrs. Dove, Ltd., the erectors of the monument, and the Foreman of Works having been presented to the Prince, the ceremony proceeded.

Air Chief-Marshal Sir Hugh Trenchard, on behalf of the officers and airmen past and present of the R.A.F., expressed gratitude to the Prince for coming to unveil the memorial. He felt that the memorial was an indication to all who passed it of the work of those who died in the air in the Great War, and its unveiling by the Prince of Wales was an honour to those who had given of their best in the air.

Viscount Cowdray, on behalf of the civilian subscribers, said that they were met there to express their affection for the Air Force, their admiration and pride in its achievement, and to pay their heartfelt tribute to those who fell in the War. On that solemn occasion they were glad to have their beloved Prince among them.

Lord Hugh Cecil, as Chairman of the Executive Committee of the Fund, said that they had erected a monument to the officers and airmen of every part of the British Empire who fell in the War. They would be moved at the sight of it to

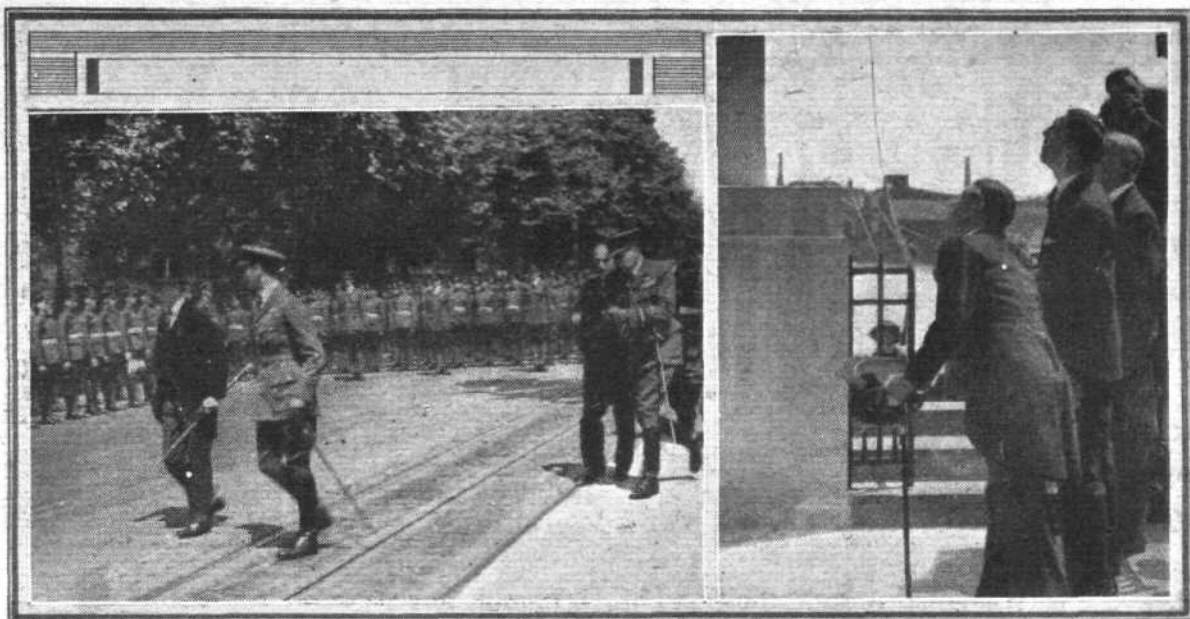


THE R.A.F. MEMORIAL as seen during the unveiling ceremony.



1 2 3 4 5 6 7 8 9 10 11

THE R.A.F. WAR MEMORIAL UNVEILING: H.R.H. the Prince of Wales speaking prior to unveiling the Memorial. Amongst those in the photograph are: 1. Sir Samuel Hoare, Secretary of State for Air; 2. Lord Hugh Cecil, P.C., M.P. (Chairman of Fund); 3. Wing Commander Louis Greig, Controller to H.R.H. Duke of York; 4. Sir Reginald Blomfield, R.A., Architect of the Memorial; 5. H.R.H. Prince of Wales, K.G.; 6. Lord Linlithgow, Civil Lord of the Admiralty; 7. Lady Garvagh; 8. Commander Towers, U.S.A. attaché; 9. Air Chief-Marshal Sir Hugh Trenchard, K.C.B.; 10. H.R.H. Duke of York, K.G.; 11. Viscount Cowdray, P.C.



R.A.F. MEMORIAL : Unveiling on Monday by the Prince of Wales. Left, H.R.H., with the Duke of York (President of the R.A.F. M.F.), inspecting the R.A.F. Guard of Honour. Right, the Prince of Wales at the moment of unveiling the memorial.

thoughts of pride and sorrow when they recalled the brave men it commemorated; it would bring to mind many pleasant reminiscences, as well as heroic memories. With their sorrow would be mingled pride and gratitude for what had been done by those gallant men who had passed away, and it was proper that their memory should be perpetuated in the more enduring medium of bronze and stone with fitting beauty and dignity of form.

The Prince of Wales said:—"This monument, erected by the Royal Air Force Fund, which I am about to unveil will stand as a lasting tribute in the heart of this great city to the memory of all ranks of the Royal Naval Air Service, Royal Flying Corps, Royal Air Force, and every other air force who played their part in the War, braving with high spirit the unknown dangers of warfare in a new element and dying to give us the final victory. Their exploits and undoubted courage have established a tradition for the new service which

our cloud armies of the future, whether in peace or war, will, I feel sure, follow with devoted pride; and the nation, on whose behalf I am asked to accept this memorial, and to whom I am to dedicate it, will ever thankfully remember the gallant lives and great deeds it commemorates."

The Rev. H. D. L. Viener (Chaplain-in-Chief of the Royal Air Force) then dedicated the memorial and offered prayer; and the Prince of Wales released the cords which kept the covering Union Jack in place.

Then followed, after a muffled roll of the drums, the "Last Post" sounded by the R.A.F. trumpeters, and then, after a final roll on the drums, came the resounding notes of the *Reveille*.

Within a few minutes of the Prince's departure the base of the memorial was almost hidden with wreaths and bunches of flowers which were deposited by the public and friends of the fallen.

WESTERN AUSTRALIAN AIRWAYS, LTD.

FROM a correspondent in Perth, W.A., under date June 1, we have received the following interesting communication regarding the work of the Company in Australia:—

There is in regular operation in Western Australia an aerial mail and passenger service linking up all important ports on the north-west coast between Perth and Geraldton and Derby.

The Western Australian Airways, Ltd., is a company that was formed in August, 1921, to carry out the Government mail contract embodying the flying of 2,390 miles per week between Geraldton and Derby and return, calling at Carnarvon, Onslow, Roebourne, Port Hedland and Broome. Since its inauguration in December, 1921, the company's machines have flown close on 200,000 miles. The majority of flying has been carried out to schedule time, and the degree of efficiency obtained has been commented upon from all quarters. Apart from carrying mails and passengers between ports on the route, a very great amount of useful work has been accomplished in cases of emergency, sickness, etc., and by the calling of machines at out-back stations, lives have been saved and comfort secured for the settlers. Surgeons and medical men have been flown to urgent cases, while sick people have been brought to hospitals.

As this portion of Australia has been rather badly served by other means of transport, the aeroplane has filled a much-needed requirement.

The technical administration of the company is in the hands of Major N. Brearley, who will be remembered in England at Gosport and Lilbourne Schools of Special Flying, and he has associated with him as leading pilots, Messrs. C. E. Kingsford-Smith, M.C., K. V. Anderson, and B. Heath, while the chief mechanic is Mr. H. P. Hansen, late Chief Master Mechanic, Australian Flying Corps.

During the greater portion of the year ideal flying conditions prevail all along the length of the route, but during the storm season, from December to March, very severe conditions are liable to be met with, and storms, known locally as "Willy-Willys," which prove a menace to shipping, burst on the coast

and travel down the coast, causing great havoc in the track they follow. On these occasions the sky becomes very dark, with winds of high velocity, making it practically impossible for an aeroplane to live, but before these disturbances arrive a few days' warning is given by the rapid falling of the barometer, and the company takes precautions by stopping the service and securing its machines in their hangars until conditions again become reasonable.

The average speed maintained for the flying so far accomplished is between 80 and 85 miles per hour, but the machines are capable of a top speed of 110 miles per hour. Six machines of the Bristol tourer coupé type are used, and these are fitted with six-cylinder Puma engines of 240 horse-power. Having an ample reserve of power, great satisfaction has resulted from the use of these machines, and interruptions to the service through mechanical troubles are practically unknown.

The usefulness of the service is evidenced by the fact that the mail carried has steadily grown from a mere handful of letters until the machines' capacity is very often taxed, while on many occasions so many enquiries are received from passengers anxious to book seats, that it would be necessary to have machines of very much larger capacity to meet the demand.

The service is operated by relays of machines and pilots, and is carried out in three sections. The machines circulate round the route, and every three weeks reach their main depot at Geraldton, where they are subjected to a thorough examination and overhaul, and by this system the regular operation of the mail has been simplified. The company is self-contained in practically every way, as the various members of its staff are capable of handling all the various problems that enter into the running of the service, and the maintenance and construction of the machines, and it is anticipated that with the development of both large and small machines and the experience gained from the lengthy operations carried out in Western Australia, the company will be in the unique position to handle aviation matters in the most up-to-date and reliable fashion over future years.



GOTHENBURG

International AERO EXHIBITION

1923



At the Gothenburg International Aero Exhibition (I.L.U.G.) which opens on Friday of this week, the British Section, thanks largely to the backing by our Government, probably forms the most important combined national exhibit in this great Show, occupying as it does the centre of the great pavilion. Fortunately, in spite of the exhibits being held up some time in the Docks through the present strike, all difficulties were overcome, and the machines arrived in Sweden on Monday last. That the British exhibits under the circumstances will be completely finished and in place for the opening by the King of Sweden on Friday morning can hardly be expected, although we have such confidence in the energies of those in charge of the organisation that we should not be at all surprised to find every British unit spick and span on view, as if no untoward events had intervened. That the machines and engines staged will be worthy of our British aeronautical industry may well be judged by the brief description which we are now enabled to give. These, we hope, will be of assistance in concentrating the attention of customers from every corner of the globe upon the sterling qualities and merits of our British productions. Once the world realises that British design and quality in aircraft spell practical immunity from risk and disaster, the placing of orders with our constructors is but a natural sequence. We look forward to valuable results in this direction, and congratulate the S.B.A.C. upon their work in connection with the arrangements for upholding British prestige. The French Section occupies the left wing of the pavilion, and the right wing houses the exhibits of the United States, Germany, Italy, Holland, Czecho-Slovakia, Sweden, Denmark and Norway. In later issues we shall be dealing with these foreign exhibits, and hope to give such a clear account of all that is worth recording that those interested who are not able to attend personally may be thoroughly informed and conversant with all that was noteworthy. Following we now give place to a brief *résumé* of the British Section :—

THE MACHINES

Armstrong-Siddeley Motors, Ltd., Coventry

THE "Siskin" single-seater fighter, which is being exhibited by this firm, is an improved and modified version of the type originally designed for and supplied to the British Government. All the experience gained in the Great War has been embodied in this machine. It is robustly constructed, and the detail work has been carried out with extreme

thoroughness and care. The landing gear enables it to be used on rough country, and very favourable reports in this connection have been received from pilots who have flown the "Siskin." The pilot has an excellent range of vision, while the position of the machine guns—two or three of which can be fitted—is such that they can easily be controlled and adjusted during flight.



The Armstrong-Siddeley "Siskin" single-seater fighter-scout, fitted with a 350 h.p. "Jaguar."

It is fitted with a 320 h.p. "Jaguar" engine, and its performance, particularly at high altitudes, is exceptional. Its speed and climb, combined with great manoeuvrability, go to make it one of the most formidable fighting machines yet produced.

The following are some of the outstanding features of the "Siskin." The fuselage is of steel tube throughout, braced with tie-rods, and no welding is used anywhere in its construction. The wings are built up of wood, with hollow spars of ample section, and the interplane struts are of steel, so constructed that the machine requires a minimum of truing-up.

By seating the pilot with his eye in line with the chord of the top plane, an unobstructed view of the upper hemisphere is obtained, whilst the view downwards is also very good owing to the narrower chord of the lower plane and the comparatively narrow fuselage.

The "Jaguar" engine is mounted on a pressed-steel frame in such a way that it can be withdrawn from the machine without disturbing the carburettor or any other of its parts. All ordinary adjustments to the engine can be carried out without removing any part of the cowl, which remains on the engine when this is dismantled. A fireproof bulkhead is mounted between the engine and the petrol tank, and the air intakes are taken well outside the aeroplane.

Petrol is fed to the engine from a gravity tank, which is kept full by means of a wind-driven pump, drawing its supply from a main tank in the fuselage. Surplus petrol drains back into the main tank, *via* an indicator gauge.

The "Siskin" is fitted with a patent Oleo landing gear, which enables landings to be made in small and rough fields with a minimum of shock. The tail skid is of exceptionally robust construction, and is arranged to swivel with the rudder to facilitate steering on the ground.

As regards structural strength, the "Siskin" is designed not only to have a high factor of safety, but also to be as safe as possible if damaged by enemy fire. A complete system of bracing is provided to the lower plane in such a manner that the load of any wire can be taken by two other wires if it should be broken. Furthermore, a wing strut can be shot away without the machine collapsing in flight, as each plane is supported by independent bracing.

The normal load carried by this machine is 400 lbs. (182 kgs.), including 180 lbs. (81.5 kgs.) for the pilot, but exclusive of petrol and oil, which are respectively 40 galls. (181 litres) and 5 galls. (22 litres), giving an endurance of from 1½ to 3½ hours. With the above load, the speed is 148 m.p.h. (238 km.p.h.) near the ground, 140 m.p.h. (225 km.p.h.) at 10,000 ft. (3,060 m.), and 130 m.p.h. (209 km.p.h.) at 22,000 ft. (6,710 m.). Landing speed, 50 m.p.h. (80 km.p.h.). The time taken to reach 10,000 ft. (3,060 m.) is 8 mins., and to reach 22,000 ft. (6,710 m.), 25 mins. The ceiling at full load is 26,000 ft. (7,950 m.).

The leading characteristics of the "Siskin" are:—Span, 28 ft. 4 ins.; length, 21 ft. 6 ins.; height, 9 ft. 6 ins.; area of main planes, 253 sq. ft.; weight fully loaded, 2,250 lbs.; loading per sq. ft., 8.9 lbs.; loading per h.p., 7 lbs.

Blackburn Aeroplane and Motor Company, Ltd., Olympia, Leeds

THE Blackburn "Swift" torpedoplane, for fleet use, which is being shown by this firm, is a machine of unusual and extremely interesting design, although it is not an entirely new type—having been originally designed in 1921. In the "Swift" the somewhat exacting requirements of this class of work have been carefully considered.

Perhaps the most serious problem in the design of machines for fleet work is to produce one capable of being safely operated from the deck of a carrier, and this has received first consideration in the "Swift," even at the expense of performance in other respects. The essentials for deck work may be said to consist of: Complete control, especially at low speeds; manoeuvrability; best possible view for pilot; rapid acceleration; low minimum flying speed; and rapid deceleration on landing.

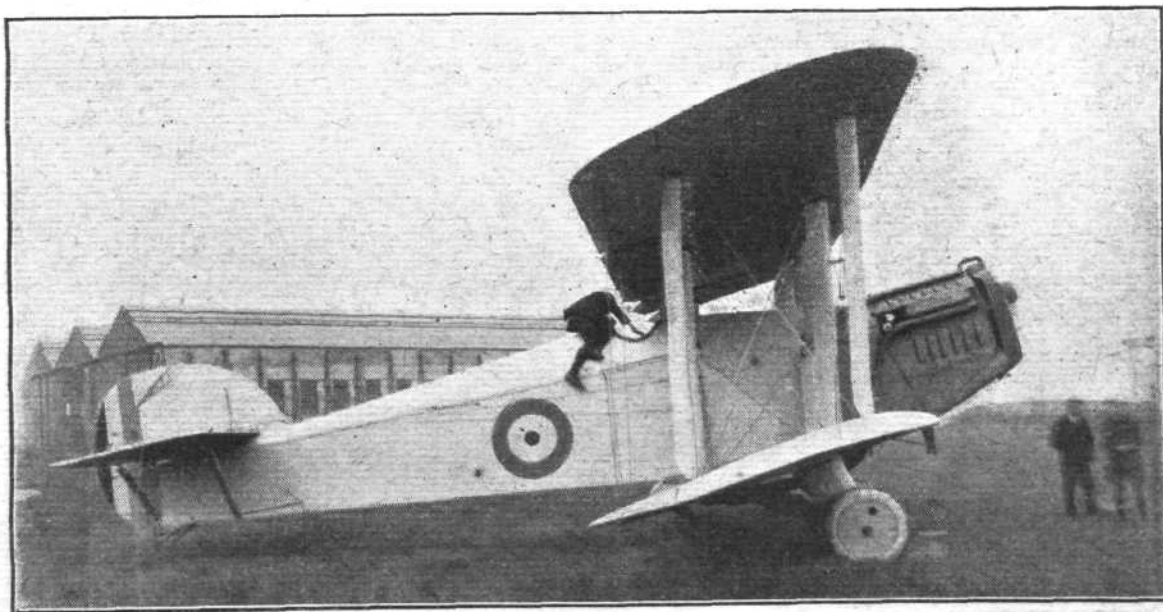
The consideration of manoeuvrability calls for concentration of loads and minimum moments of inertia about all axes. For quickly turning and banking, as may be necessary in landing on a deck, the yawing and lateral moments of inertia are all-important, and these two depend almost entirely on the size of the wings, which, therefore, have to be kept as small as possible. For minimum flying speed the use of a highly-cambered aerofoil suggests itself, but this is ruled out on the score of the first consideration—*i.e.*, control at low speeds.

It is consequently necessary to find the best possible compromise between the conflicting requirements of small planes and low minimum speed. Aerofoil No. 64 has consequently been chosen as being much the most efficient aerofoil having a medium lift coefficient, whilst the area has been fixed as low as possible—sufficient for getting off the deck in the distance available.

In order to keep the moments of inertia down the span is made as small as possible, and the chord being the largest that will fit into the required folding dimensions after allowing for putting the torpedo in place with the wings folded.

The planes are staggered, partly to gain a little on lift coefficient and efficiency, but chiefly to improve the pilot's view downward and forward. The pilot is placed high up, his eyes being in line with the top plane, and the forward part of the fuselage fairing falls away at a steep angle giving him a clear view horizontally forward over the engine, even when climbing or when flying throttled at a low speed. At top speed the pilot has a clear view forward for some 12° below the horizontal, and on either side of the fuselage for 50° below the horizontal. Rapid acceleration is aimed at by providing a propeller which will give good thrust at low speeds, and the minimum flying speed is reduced by arranging the propeller, as regards position and angle, so that the main planes get the full benefit of the slipstream. Careful calculations, including the slipstream effect, show that the machine should be capable of flying with full load at 39 knots, whereas the stalling speed in a glide is 43 knots. For landing on deck without the torpedo the stalling speed is 37.5 knots.

Rapid deceleration is provided for by arranging that the



The Blackburn "Swift" torpedoplane, fitted with a 450 h.p. Napier "Lion."

wings reach an angle beyond that of the maximum lift coefficient when the tail skid touches the deck. On getting the tail down the lift consequently falls off, and the risk of bouncing is reduced while the drag is greatly increased.

The centre section has been designed entirely in steel tube with fittings machined from the solid, and the engine mounting, chassis, main spars, and fuselage longerons all joint directly on to these solid fittings with their centre lines meeting correctly at a point in each case. It is considered that this form of structure is free from any of the strains incidental to structures in which heavy loads are carried through timber by lugs and bolts, and it must be free from warping due to climatic variations. In the chassis all bent tubes are avoided, and bending moments are provided for by a patented triangulated system. The springing is of the compression rubber type which has been found very satisfactory in service and to need only very rare renewal. In the tail skid a similar form of springing has been adopted.

The sternpost of the fuselage, which is of steel tube, is used as the cylinder for these rubbers, and is carried up as a cantilever support for the fin and rudder, thus eliminating all bracing above tail plane. The tail plane adjusting gear is also carried on this tube.

Channel section spindled spars of spruce are used for the main planes and tail plane, and solid spruce for the longerons. Interplane struts are of steel tube.

The engine is a Napier "Lion," carried on a mounting of steel tubes, and is very accessible, the cowling being made so as to be quickly removable. A radiator of ample proportions, fitted with shutters, is mounted in the nose.

The main petrol tank (66 galls.) is carried in the fuselage, at the c.g., and supplies petrol to a Vickers pump placed below the tank. The supply is carried up to a three-way cock, leading (a) to the carburettors, (b) to the gravity tank (16 galls.) in the top plane; a separate pipe runs from the hand pump to the gravity tank.

A fire-proof bulkhead is fitted in front of the main petrol tank, only one petrol pipe being led through it.

For alighting on the water floatation gear is fitted, and provision is made for throwing off the wheels in flight.

The "Swift" is designed to carry an 18-in. torpedo and the necessary dropping and adjusting gear. The full load carried, including pilot, torpedo and gear, instruments, fuel, oil, etc., is 2,876 lbs. The following is the approximate performance:—Top speed, 95 knots; rate of climb at sea level, 650 ft./min.; ceiling, 15,000 ft.; run to get off in a 20-knot relative wind, 150 ft.

Bristol Aeroplane Company, Ltd., Filton, Bristol

ONE of the machines which achieved considerable merit during the Great War in the service of the British Air Force, and which even today is to be found in large numbers on the active list, both in the British Air Force and in various foreign services, is the Bristol Fighter, type F.2B. This machine undoubtedly fulfilled the exact requirements for which it was designed—general fighting, bombing, and reconnaissance duties—and its quality of performance was only limited by the performance of the engines available at the time of its use. The engine with which it was then fitted was the 260 h.p. Rolls-Royce "Falcon," and it must be admitted that this combination left little to be desired. Since that time, however, considerable development has taken place in aero-engines, and higher powers and better performance with

aero-engines is now available. In this connection the success attained by the 400 h.p. Bristol "Jupiter" engine is well known; it is not surprising, therefore, that the Bristol Company have considered the question of adapting the already famous "Fighter" aeroplane for a renewed period of successful activity.

The result of this "monkey gland grafting" experiment has, we understand, given very satisfactory results, and the "F.2B" has not only been entirely rejuvenated, but it is now livelier than ever! One of these machines is being shown at the Gothenburg Exhibition, in addition to the "Jupiter" engine itself, the "Lucifer" engine and the Bristol gas starter.

From the accompanying illustration of the new "F.2B" it will be seen that the Bristol Company have succeeded in making an extremely fine job of this new installation, and the "Fighter"—always, to our way of thinking, a very pretty and business-like looking machine—has, if anything, improved in appearance, as well as in performance.

As regards the general design and construction of the Bristol "Jupiter-Fighter," inasmuch as the original "F.2B" is so well known—to most of our readers, at any rate—and as we are somewhat restricted as to space in this review of the Exhibition, it should suffice if we briefly set forth its principal features.

The outstanding features, perhaps, are to be found in the design of the fuselage and the arrangement of the wings. The fuselage is of rectangular section tapering at the rear to a horizontal knife-edge, thereby enabling the various tail members to be brought down low, out of the way of the gun. The top of the fuselage is kept flat for this purpose, also. In order to bring the position of the pilot and the gunner as high as possible in relation to the top plane without increasing the depth of the fuselage, the lower plane is not, as is usually the case, attached direct to the bottom of the fuselage, but runs right underneath some distance below. The wings, in this case, are attached to a small lower centre section, secured to the fuselage by short struts, or brackets. This arrangement, of course, necessitates a slight modification in the orthodox type of undercarriage, but the difficulty, as may be seen from the illustration, has been very neatly overcome.

Thus the pilot and gunner both have an excellent range of vision according to their respective requirements. The pilot is situated forward, immediately aft of the top plane rear spar, while the gunner, with his gun mounting, sits just behind.

The performance, dimensions, etc., of the "Jupiter-Fighter" are:—Speed at ground level, 133 m.p.h.; at 10,000 ft., 129 m.p.h.; at 15,000 ft., 120 m.p.h., and at 20,000 ft., 105 m.p.h. Rate of climb to 6,500 ft., 10,000 ft., 15,000 ft. and 20,000 ft., come out at 5, 8½, 14½, and 27½ mins. respectively. The service ceiling is 22,500 ft.

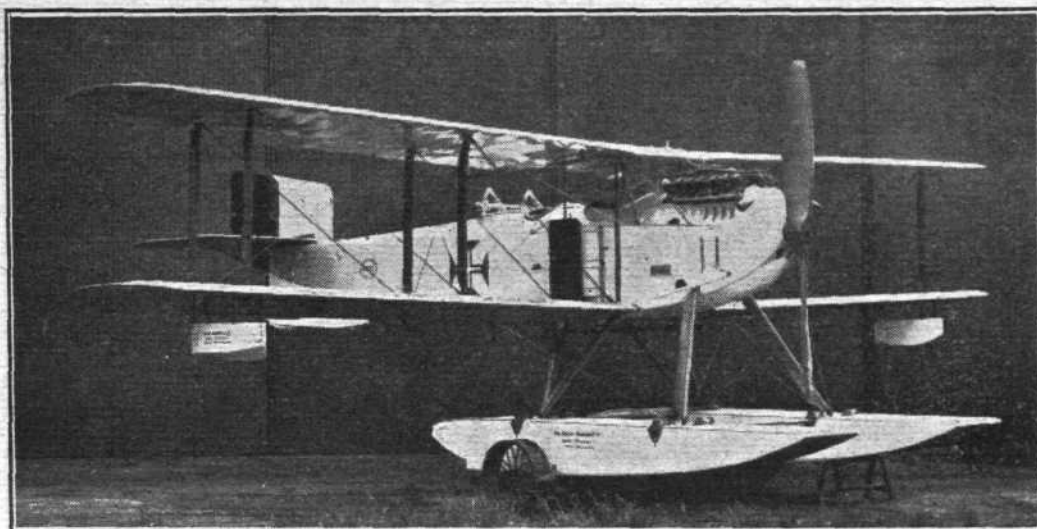
Span, 39 ft. 3 ins.; chord, 5 ft. 6 ins.; overall length, 25 ft.; weight empty, 1,860 lbs.; weight fully laden, 3,350 lbs.; weight per sq. ft., 8·27 lbs.; weight per h.p., 8·4 lbs.

Fairey Aviation Company, Ltd., Hayes, Middlesex

THE Fairey exhibit at Gothenburg is a Series III D Seaplane. While they are prevented from showing their latest types of aircraft, it should be pointed out that the Series III is still in production as a Service type—an order for some of these machines being in hand at the present moment. In case our readers should think this is an old type of machine we might add that the III D is the fastest

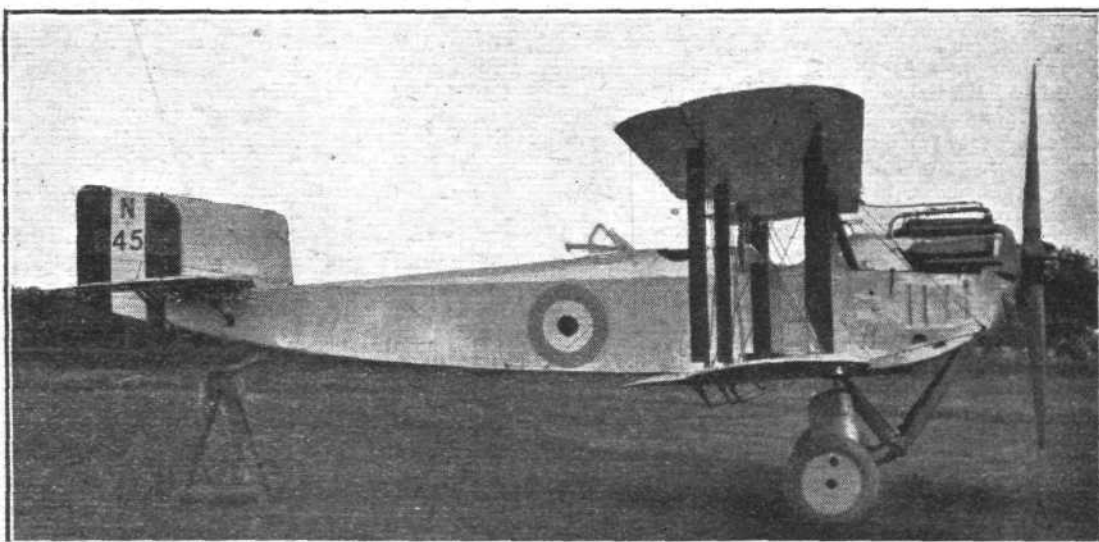


The Bristol "Jupiter-Fighter," the latest version of the famous F.2B "Fighter," fitted with a 400 h.p. "Jupiter" engine.



The Fairey Series
III D seaplane.
The machine
shown here is
fitted with a 360
h.p. Rolls-Royce
"Eagle IX."

The Fairey Series
III D, converted
to a land machine
by the substitution
of oleo under-
carriage for
floats. A 450 h.p.
Napier "Lion" is
fitted to this
machine.



type of the Series III—which has, modified from time to time, given such excellent service since the first of the type was designed in 1917—incorporating all modern modifications and constructional improvements.

That this machine is up to modern requirements is borne out when we state that by the latest test the Series III D, fitted with a 450 h.p. Napier "Lion," has a top speed of 116 m.p.h. at 12,000 ft., a ceiling of 18,000 ft. with full load, a rate of climb of 1,300 ft. per min. at sea level, and 600 ft. per min. at 10,000 ft., carrying a total useful load of 1,650 lbs.

This machine can be converted from a seaplane to a land machine, or deck type, and the Fairey Oleo-pneumatic chassis employed for this purpose is also shown.

The Fairey Series III is a tractor fuselage biplane of some 46 ft. wing span, and when used as a seaplane is fitted with twin floats of the latest Fairey design, which are constructed after boat-building practice.

The principal feature of this machine—as with all other Fairey types—is in the patent variable camber gear. This is an extremely simple and effective device, consisting of an arrangement, worked by cables from the pilot's cockpit, for pulling down the entire trailing edge of the wings and thereby increasing the camber and consequently the lift. The whole trailing portion of the wing, from the rear spar to the trailing edge, is hinged, the outer portions, at the tips, being separate from the rest, so that the differential aileron movement is retained at the same time. In other words, the ailerons function as usual with the flap at any position. The effect of this arrangement, which has proved very satisfactory in practice, is to allow of a considerably higher wing loading without any increase in the landing speed.

Apart from the flap gear the wing construction more or less follows standard practice. The wings are made to fold back, vertical pins in the rear spar fitting forming the pivots. The fuselage is of the usual rectangular girder construction, with ash longerons and struts in front and spruce members aft. The longerons are straight, and do not taper, with the result that the fittings are identical throughout the greater part of the fuselage.

The tail is of the trimming type, with divided elevators. The rudder, of ample proportions, is balanced, and a large vertical fin is mounted in front.

The pilot's cockpit is located forward between the planes, and immediately behind him, well back of the planes, is the gunner's compartment, which is large and roomy.

Gloucestershire Aircraft Company, Ltd., Cheltenham

THE Gloucestershire Aircraft Company, the constructors of the world-famous "Mars I," or "Bamel" racing machine, which holds the British speed record of 196.6 m.p.h., have two types of machines at Gothenburg, one on view in the exhibition itself, and the other giving actual flying demonstrations. Both machines are of recent design, for which Mr. H. P. Folland, who also designed the "Mars I," is responsible, and, as may be expected, possess several distinctive features.

The first of these machines—that which is being shown in the exhibition—is known as the Gloucestershire "Grouse," and has been designed with the object of serving the purpose of an intermediate type of scout for training work, or it can equally be employed as a ship's plane for duties with the fleet.

As will be seen from one of the accompanying illustrations, it is a single-seater tractor biplane, with a comparatively deep and well streamlined fuselage. The special feature of the "Grouse" is in the improved arrangement of the wings, which have high lift and medium lift sections. The top plane, it will be observed, is very much larger in comparison with the lower plane, both as regards span and chord. It is stated that in actual tests these wings have proved to be superior to the more orthodox arrangement usually employed on machines of this type, in that a lower landing speed, greater load-carrying capacity, and a better performance at the height of operation required for a scout, are obtained. The controllability, stability and general handling of the machine is also greatly improved.

The top planes are in two sections, and are attached to a pylon of two inverted V's of steel tubing, while the lower



The Gloucestershire "Grebe," a single-seater fighter scout, fitted with a 350 h.p. "Jaguar." This machine will be flying during the Exhibition.

planes, also in two sections, are attached to short wing roots on the lower longerons of the fuselage. There are one pair of interplane struts each side, and the ailerons, which are fitted to both upper and lower planes, are connected by struts.

Another interesting feature is the petrol system, which is direct gravity feed, and is of such simple nature as to be quite fool proof. Reference to the illustration will show how the two large petrol tanks are located on the top plane—well away from the fuselage.

The general dimensions of the "Grouse" are:—Span, 27 ft. 6 ins.; overall length, 19 ft.; height, 9 ft. The engine fitted in this machine is a 230 h.p. B.R.2, rotary, air-cooled.

The second machine, the "Grebe," which will be flying during the exhibition, has been designed as a high altitude fighting scout, embodying the special arrangement of high lift and medium lift wing sections, as in the "Grouse."

Having been designed at the request of the British Air Ministry it is not permitted to give full details, but it may be said that on actual flight trials the machine shows good improvement in performance at altitude, and, whilst having greater loading-carrying capacity, its manoeuvrability and general handling is a considerable improvement.

Amongst detail improvements the petrol system may be mentioned as being simplicity itself and quite foolproof, and the tanks being mounted in the wings gives greater immunity from fire.

The general dimensions are:—Span, 29 ft.; length, 19 ft.; height, 9 ft.

The engine fitted is a 350 h.p. Siddeley "Jaguar."

Handley Page, Ltd., Cricklewood

THE Handley Page exhibit is one of the most interesting machines in this section, in that it represents what may be said to be the first "production" example of the application of the Handley Page slotted wing to a service-type machine. It is, of course, not the first appearance, as a similar machine was exhibited at the last Paris Salon.

The machine in question is the "Hanley" No. 143 torpedo carrier, and is intended for duties with the fleet. As we have

pointed out elsewhere, the designing of a machine for this class of work presents several problems which are by no means easy to solve. In the first place dimensions must be kept down to a minimum, folding wings being a desirable feature, and, secondly, the machine must combine low landing-speed and quick get-off for safe "deck work," and at the same time possess a high degree of manoeuvrability for its duties when once in the air. Several designers have given a great deal of attention to this somewhat complicated question, and of the special machines which have been produced to attain this end, the Handley Page incorporating the slotted wing is not only one of the most modern, but the practical tests which have been carried out up to the present appear to promise an entirely successful issue.

We do not propose here to go into the theory of the slotted wing, as this would entail a somewhat lengthy article in itself, and this subject has already been dealt with on more than one occasion in FLIGHT. We will, however, briefly set forth the general features of the "Hanley" as a whole, together with the following notes referring in particular to the slotted wing. It may be mentioned that a detailed description of this machine appeared in FLIGHT for November 30, 1922.

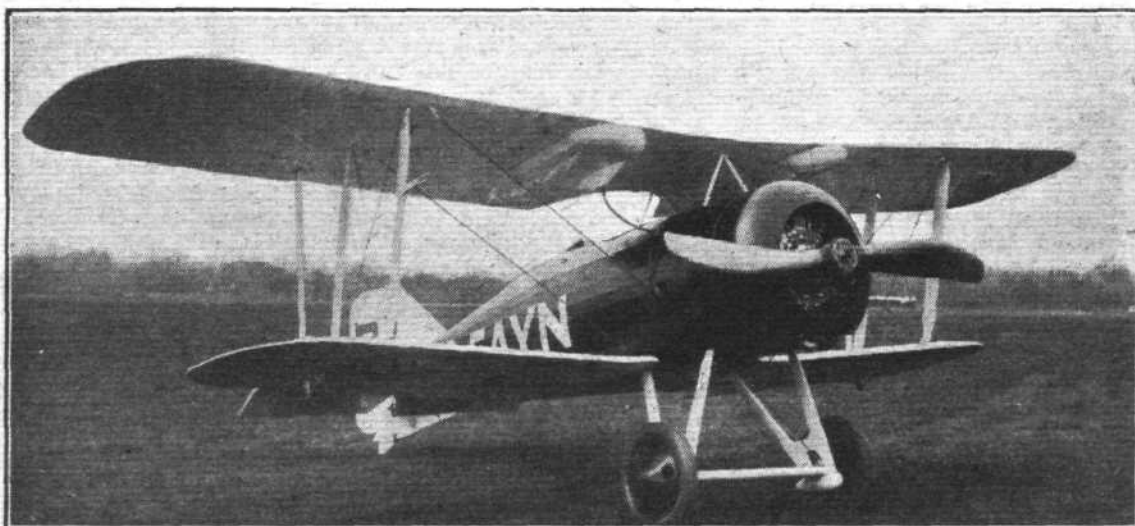
The wing section used is 0/100 or a slightly modified form of R.A.F./3, with front slot. In the original wing the auxiliary aerofoil is pivoted about a point towards the nose.

There is a 50 per cent. increase in lift on opening the slot, enabling the speed to be reduced by more than 12 m.p.h. on a machine with 11 lbs./sq. ft. loading.

Slotted ailerons are also used to increase the rolling moment of the machine, thereby considerably improving the lateral control at low speeds.

In the latest development of this wing, however, there is a slight modification. Here, instead of the pivoted thick section for the auxiliary aerofoil, one of the single surface type has been adopted. By moving this aerofoil forward to open the slot and backward to close same, several advantages accrue. The main features are the increase in area obtained (this can be of the order of 10 per cent.) and the non-movement of the centre of pressure on opening the slot, due to the forward

The Gloucestershire "Grouse," an advanced training scout, or ship's 'plane, fitted with a 230 h.p. B.R.2 rotary engine.





The Handley Page "Hanley" No. 143 Torpedo Carrier, with H.P. slotted wing. It is fitted with a 450 h.p. Napier "Lion."

movement of the auxiliary aerofoil balancing the backward movement of the centre of pressure. With the first type of auxiliary aerofoil, on opening the slot the centre of pressure moves back and has to be corrected by tail adjustment. This has now been entirely eliminated. Not the least important quality of the slotted wing is that it renders a machine practically "un-stallable."

Turning now to the general design of the machine itself. It is a tractor biplane with a rectangular section fuselage, built-up on more or less orthodox lines, being of girder construction with spruce longerons and struts, braced by streamline wire and tie-rods.

In the nose of the fuselage is a tubular structure, entirely separated from the main portion of the fuselage by a metal-covered bulkhead, for the mounting of the Napier "Lion" engine. The oil tank is mounted behind the engine, but the petrol tank is located in the fuselage behind the bulkhead.

A number of rubber-proofed floatation bags are housed within the fuselage aft of the pilot's cockpit, for the purpose of keeping the machine afloat should a descent be made upon the water.

Built as an integral part of the fuselage is a lower plane centre section, extending outwards for a short distance on each side of the fuselage and braced thereto by sloping struts. On this section are mounted the lower wings, which are hinged at the rear spar so that they can fold back. The mechanism for operating the slot is carried on the front spar of the centre section, and also the fitting for locking the wings.

The upper wings are carried by a top centre section supported on the fuselage by sloping struts. Apart from the

slot gear, the main planes are of more or less orthodox construction, the spars being box form, of spruce, and the ribs of the lattice type. The slotted ailerons are fitted to both upper and lower planes.

The tail plane is of the trimming type, adjustable during flight, to which is hinged the divided elevator, whilst the rudder has a triangular balance working in a cut-out portion of the vertical fin. The controls are of the standard type.

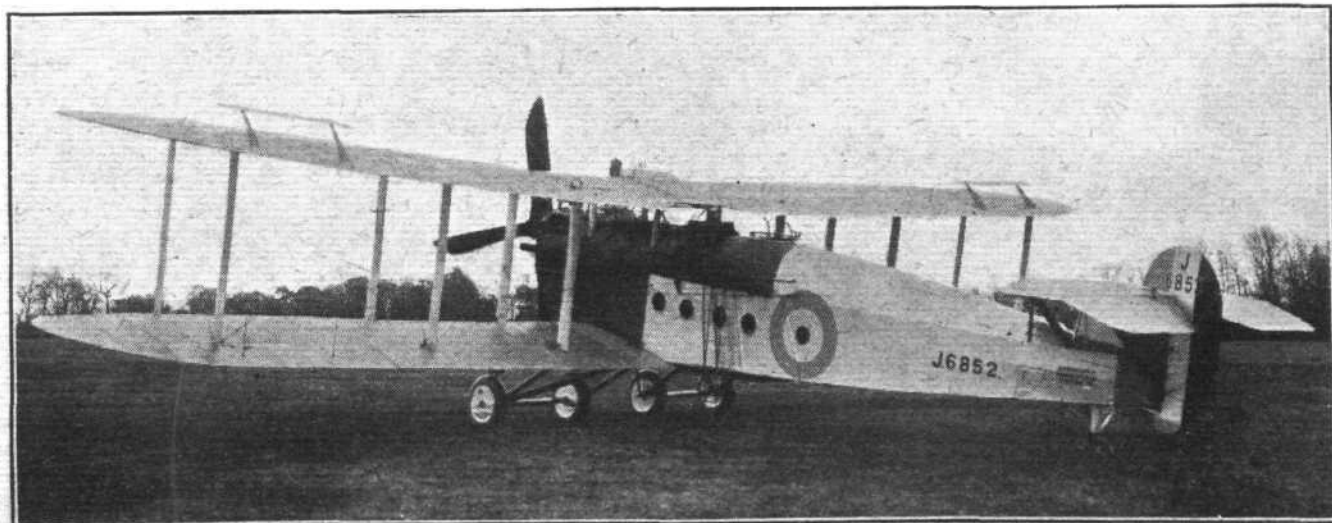
The undercarriage has been specially designed to accommodate the torpedo, and, in consequence, is of comparatively wide track. The pilot's cockpit is located just aft of the trailing edge of the top plane. In addition to the usual instruments it is "furnished" with a few extra "gadgets" connected with the slot control and torpedo gear.

On the whole it is a most interesting machine, calling for a thorough inspection.

A. V. Roe and Co., Ltd., Manchester

THE machine which will be exhibited by A. V. Roe and Co., Ltd., at the Gothenburg Exhibition, Aircraft Section, is an Avro "Aldershot-Cub," fitted with a 1,000 h.p. Napier "Cub" engine. Unfortunately, having been but recently designed for the British Air Ministry, constructional details of this interesting machine are not available, and we are, therefore, only able to give but the briefest general description.

The "Aldershot-Cub"—the most powerful single-engined aeroplane in the world—is a development of the standard Avro "Aldershot" long-distance bomber, which is fitted with a 650 h.p. Rolls-Royce "Condor" engine. This latter machine, it may be of interest to note, made its first appearance



The Avro "Aldershot-Cub" long-distance bomber, fitted with a 1,000 h.p. Napier "Cub." This is the largest single-engined machine in the world.

at the 1922 Royal Air Force Pageant, when it took part and obtained first place in a handicap race flown on that occasion.

As fitted with the "Cub" engine, the "Aldershot" has been modified in one or two details as compared with the Standard machine—for instance, a four-wheeled oleo undercarriage in place of a two-wheeled one.

The most interesting feature of this machine is its very large fuselage, which has two decks. On the top deck, or upper storey, the pilot and machine gunner are accommodated, the former being located under the trailing edge of the top plane, with the gunner immediately behind him. The lower deck is fitted with the bomb sighting and dropping gear. This "pill dispensing compartment" is provided with port-hole windows in the sides of the fuselage, and is remarkably roomy.

To carry out all its functions this machine needs a crew of three, and arrangements are ingeniously contrived so that they can change places whilst the machine is in flight. Ladders are in position between the decks, making it easy for the crew to change positions as required.

The wings of the "Aldershot" are swept back, and are designed so that they will fold back, thus economising considerably in space for housing purposes. Considering the size of the wings the arrangements for folding—a by no means easy problem in this particular case—have been exceedingly well carried out, and alone constitute a remarkable piece of designing.

The whole machine, with the exception of certain parts of the wings, is constructed of metal.

The tail plane, which by itself would almost serve as a wing for a light 'plane, is mounted above the rear extremity of the fuselage, on the top of a large vertical fin. The ailerons on the top plane are provided with small auxiliary balancing planes, which extend above and forward of the ailerons.

Another interesting point is that the machine is fitted with self-sealing tanks, so that should they be pierced by bullets they would not leak, burst or catch fire. The machine is fitted with dual control, the two pilots being seated side by side.

As this machine is designed for long-distance flights, special electrical equipment is installed for keeping the hands and feet of the crew warm, and at the same time preventing the guns from freezing.

It is interesting to note the compactness of the machine and the small appearance of the nose when one considers that a 1,000 h.p. is stored away in a length of only 7 ft. 6 ins. It is necessary to have a small petrol engine, which is fixed in the machine, to start the big engine.

As regards the performance of the "Aldershot-Cub," while no actual figures are available, it may be said that on the occasion of the Royal Air Force Pageant held this year at Hendon, when it took part in the parade and "fly past," together with various other types of Service machines—from single-seater scouts upwards—it seemed to take off, "zoom," and land with as much ease as did the smaller fry.

Vickers, Ltd., Vickers House, Broadway, London, S.W. 1

THE well-known firm of Vickers are, in addition to various aircraft component parts referred to hereafter, showing the "Viking" Mark IV, a pusher biplane amphibian flying-boat, fitted with a 450 h.p. Napier "Lion," and intended for general service.

The building of the "Viking" was first discussed in

December, 1918, and "Viking" Mark I was flying in February, 1919. The experience gained with this type was incorporated in "Viking" Mark II, which was launched at the end of that year.

After many improvements had been added to this machine, she was entered for the Antwerp Exhibition in July, 1920, and was classified as first in the following:—(a) Shortest time in getting off the water; (b) fastest time over a given circuit; (c) shortest time in climbing to 1,000 metres; (d) highest "ceiling" or altitude with full load.

This competition was an international one, open to all types of seaplanes and flying boats, so that the success of the "Viking" was particularly creditable, and a noteworthy triumph of the amphibian over other types.

The development of this type of aircraft was considered so vital by the British Air Ministry that early in 1920 a prize of £10,000 was offered by them for the most efficient type of amphibian produced in the British Isles.

In this competition, which took place in September, 1920, the first prize of £10,000 was won by the "Viking" Mark III, and it was won under such exacting conditions that only an exceptionally well designed and constructed machine could have withstood the tests.

The advantages of the amphibian type of machine are obvious, as it can arise from or alight on either land or water at will, whereas it is undesirable for an ordinary seaplane to fly large distances over land, or for a land machine to fly over large tracts of water.

The "Viking," owing to its exceptional performance and manoeuvrability, can get off from or alight on a seaplane carrier. Furthermore, after rising from the deck, it can, of course, alight with safety on the water—a decided advantage over the ordinary land type ship's 'plane. The ordinary flying boat is at a disadvantage for use on seaplane carriers, seeing that it cannot alight on the ship's deck nor arise from it.

In the "Viking" the wings are made to fold by a novel method, thus economising space. The wings fold forward, so that in flying the strain tends to keep them in position. When folded the "Viking" Mark IV occupies a space of 32 ft. by 35 ft.

It is proposed to fit skis instead of wheels to this machine, so that a landing on or a rising from snow can be effected, and for use in countries that are snow-bound during certain periods of the year, it is proposed to fit skis in addition to wheels.

With the ordinary flying boat or seaplane, it has to be provided with a trolley in order that it may enter the water from its hangar, or *vice versa*. The "Viking" carries its trolley with it in the shape of the retractable undercarriage, and by a simple operation the pilot lets down the wheels on approaching the slipway from the sea. Under its own power and without the assistance of a single attendant it runs up the slipway and into the hangar or from the hangar down the slipway into the sea.

As regards the general and constructional features of the "Viking." It has seating accommodation for six (including pilot) in open cockpits. The hull has many distinctive features, both in the design and in the construction, but, unfortunately, we have not the space now to more than draw attention to their presence. Mahogany and elm are mainly used in the construction of the hull. The main planes and tail planes are of spruce construction for ribs and spars, and



The Vickers "Viking," Mark IV, amphibian flying boat, fitted with a 450 h.p. Napier "Lion."

mild steel tube for internal and interplane struts; bracing is by swaged and streamline wire. Control surfaces are built up of mild steel tube with spruce ribs. The main petrol tanks are carried within the hull, and a gravity tank in the upper plane is supplied therefrom by means of a Vickers wind-driven pump. The controls are of the standard wheel type.

The guaranteed performance, under standard conditions,

of the "Viking IV" is as follows:—Full speed near sea level, 113 m.p.h.; minimum speed, 48 m.p.h.; climb to 5,000 ft., 8½ mins.

The general dimensions are as follows:—Span, 50 ft.; chord, 7 ft. 1 in.; overall length, 34 ft. 2 ins.; height, 14 ft.; gap, 7 ft. 7 ins.; area of main planes, 635 sq. ft.; weight of machine empty, 4,030 lbs.; weight fully laden, 5,790 lbs.; loading per sq. ft., 9.12 lbs.; loading per h.p., 11.9 lbs.

THE ENGINES

Armstrong-Siddeley Motors, Ltd., Coventry

Two types of aero engines are shown by this firm, the 175 h.p. "Lynx" and the 350 h.p. "Jaguar," both of the radial air-cooled type, the former having seven cylinders and the latter 14.

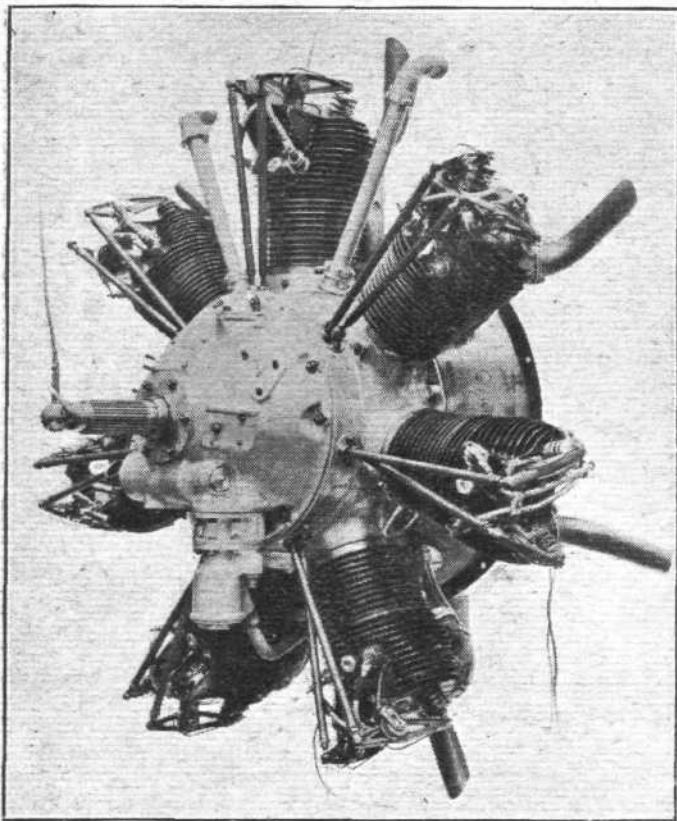
The "Lynx" engine is the result of much experimental work. The following are the principal points which it is claimed make it particularly suitable for use on an aeroplane: The oiling system is unique. The big ends of the connecting rods are not only lubricated but are cooled by a generous supply

The crankshaft is in one piece of exceptional stiffness. It is supported by roller bearings everywhere. The propeller thrust is taken by a single thrust race, so mounted that it absorbs thrust in either direction. The patented system of double oil circulation cools the crankshaft and big end.

The lubrication is on the dry sump principle. Any excess of oil is collected in an extension at the bottom of the crankcase and pumped back to the tank through a filter. The pressure pump delivers oil to the hollow crankshaft which is drilled with a double system of holes, out and return, so that the oil circulates from the front to the extreme back, and to the front again, where it is freely delivered to the timing gear. This system not only keeps the crankshaft and big ends cool, but makes the lubrication of the crankpins absolutely sure, as the oil is supplied to them from both the out and return lines. A second filter is inserted between the pressure pump and the crankshaft. Both oil pumps and filter are mounted in front of the engine, and are consequently quite accessible.

The timing gear is of the epicyclic type, the cams rotating at 1/6 crankshaft speed. It is mounted entirely on ball and roller bearings. There are two independent cams, inlet, and exhaust. The overhead valves are operated by push-rods in front of the engine and rockers mounted on ball bearings.

The induction system is composed of pipes radiating from a central chamber containing a fan mounted on the back of the crankshaft. This not only increases slightly the volumetric



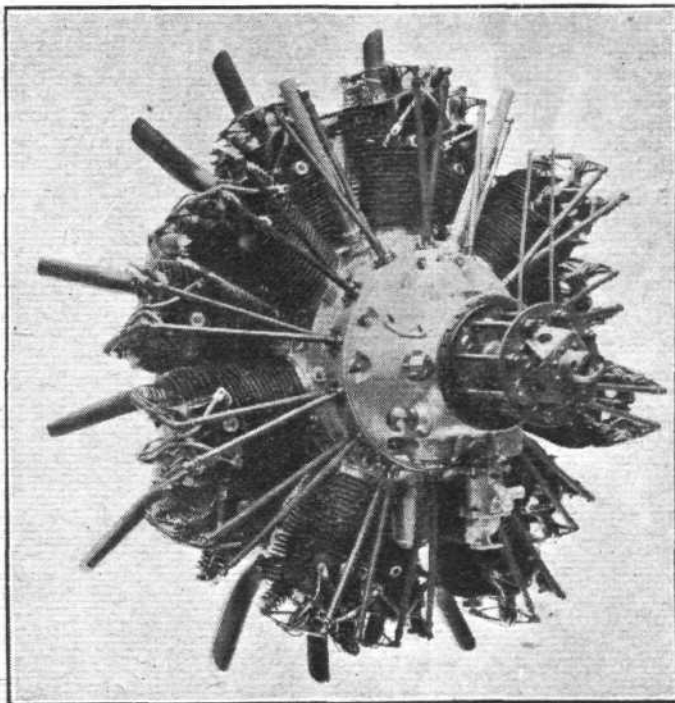
The Armstrong-Siddeley 175 h.p. "Lynx" seven-cylinder air-cooled radial aero engine.

of oil, a small part of which only can get to the cylinders. The engine is particularly clean running and the oil consumption in flight is well under half a gallon an hour. The carburation is thoroughly satisfactory, and the gas distribution is practically perfect. The engine can be throttled down and opened up rapidly without missing.

The accessibility is extremely good, and any cylinder can be removed in a few minutes, while it is easy to get at all accessories. The mounting in the aeroplane will appeal to all aeroplane designers as a satisfactory solution of a difficult problem. A steel pressing, which is supplied with the engine, finishes in a flange in which are 16 holes, drilled on a 25-in. pitch circle. This flange is carried clear of the engine, enabling a simple engine plate to be used.

The fuel consumption at full power on test is as low as .525 pint (.298 litre) per horse-power hour, and the makers are prepared to guarantee a consumption of not more than .55 pint per b.h.p. hour at full load.

The cylinders have steel barrels screwed into hemispherical aluminium heads. The latter are thoroughly annealed in order to prevent growth and distortion. The pistons are of aluminium alloy, fitted with two compression rings and two scraper rings. The gudgeon pin is of ample size and floats both in the piston and in the connecting rod. The connecting rod system is unique. The master rod proper is separate from the split big end, which is designed so that all rods can easily be dismantled. The wrist pins are floating.



The Armstrong-Siddeley 350 h.p. "Jaguar" 14-cylinder air-cooled radial aero engine.

efficiency, but thoroughly mixes the incoming gases and makes for almost perfect uniformity of distribution. The mixture is heated, being jacketed with lubricating oil. This not only serves to heat the mixture, but also helps to cool the lubricating oil. The carburettor can be mounted any distance below the rear cover that is desired, by means of a junction piece which can be of any length necessary. This junction piece can be exhaust jacketed if required.

The main characteristics of the "Lynx" are:—Bore, 5 ins. (127 mm.); stroke, 5½ ins. (140 mm.); normal r.p.m., 1,500; maximum safe r.p.m., 1,650; b.h.p. at normal r.p.m., 175; b.h.p. 1,650, 190; direction of rotation, left hand tractor; petrol consumption, .525-.55 pint per h.p. hour; oil consumption, .03 pint per h.p. hour; weight complete, 460 lbs.; weight per b.h.p., 2.56 lbs.; diameter, overall, 43 ins.

The "Jaguar" embodies most of the characteristics of the "Lynx," previously set forth. The absence of vibration at all speeds is a noteworthy feature in the "Jaguar."

The cylinders, pistons and connecting rods are of similar construction to that obtaining in the "Lynx." The crankshaft is also similar, except for the modifications rendered necessary by the extra number of cylinders.

The lubrication is on the dry sump principle, as on the "Lynx," whilst the same induction system is employed. The epicyclic timing gear which has proved satisfactory on the "Lynx" is also used in the "Jaguar."

The main characteristics of the "Jaguar" are:—Bore, 5 ins. (127 mm.); stroke, 5½ ins. (140 mm.); normal r.p.m., 1,500; maximum safe r.p.m., 1,650; b.h.p. at normal r.p.m., 350; maximum b.h.p., 380; direction of rotation, left hand tractor; petrol consumption, 525·55 pint per h.p. hour; oil consumption 0·03 pint per h.p. hour; weight complete, 760 lbs.; length, overall, 43 ins.; length, engine plate to back of propellers, 25½ ins.; diameter, overall, 44 ins.; diameter which may be covered by fore cowl, 29 ins.; diameter, bearing bolt pitch circle, 25 ins.

Bristol Aeroplane and Motor Company, Ltd., Filton, Bristol

Two engines are shown by the Bristol Company, in addition to the "Jupiter-Fighter" aeroplane. These are the 400 h.p. "Jupiter" and the 100 h.p. "Lucifer." Both are of the radial air-cooled type, the former having nine cylinders and the latter three, and both engines recently did remarkably well in the Air Ministry Type Tests, which they passed with flying colours. The "Jupiter" also passed the French tests of the Section Technique.

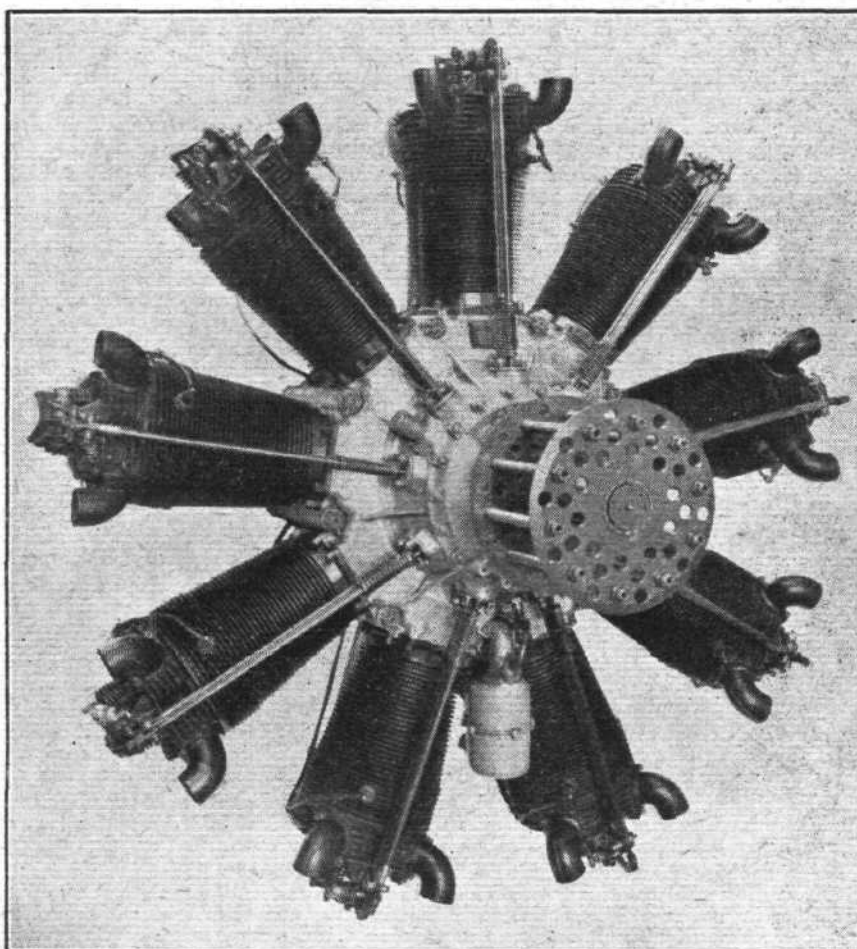
The principal features of the "Jupiter" engine lie in the cylinder construction and in the induction system. The cylinders are of steel, turned from forgings, with integral combustion head. There are two inlet and two exhaust valves per cylinder carried, on separate seatings, in an aluminium cylinder head. The valve tappets are fitted with a compensating device for correcting the tappet clearance in connection with the expansion of the cylinders due to changes of temperature.

Briefly, the induction system is as follows: Mixture from three carburettors is led to a chamber formed at the rear of the crankcase. Within this chamber is a spiral ring having three deep spiral flutes formed in it, the pitch of each spiral corresponding to the pitch of three

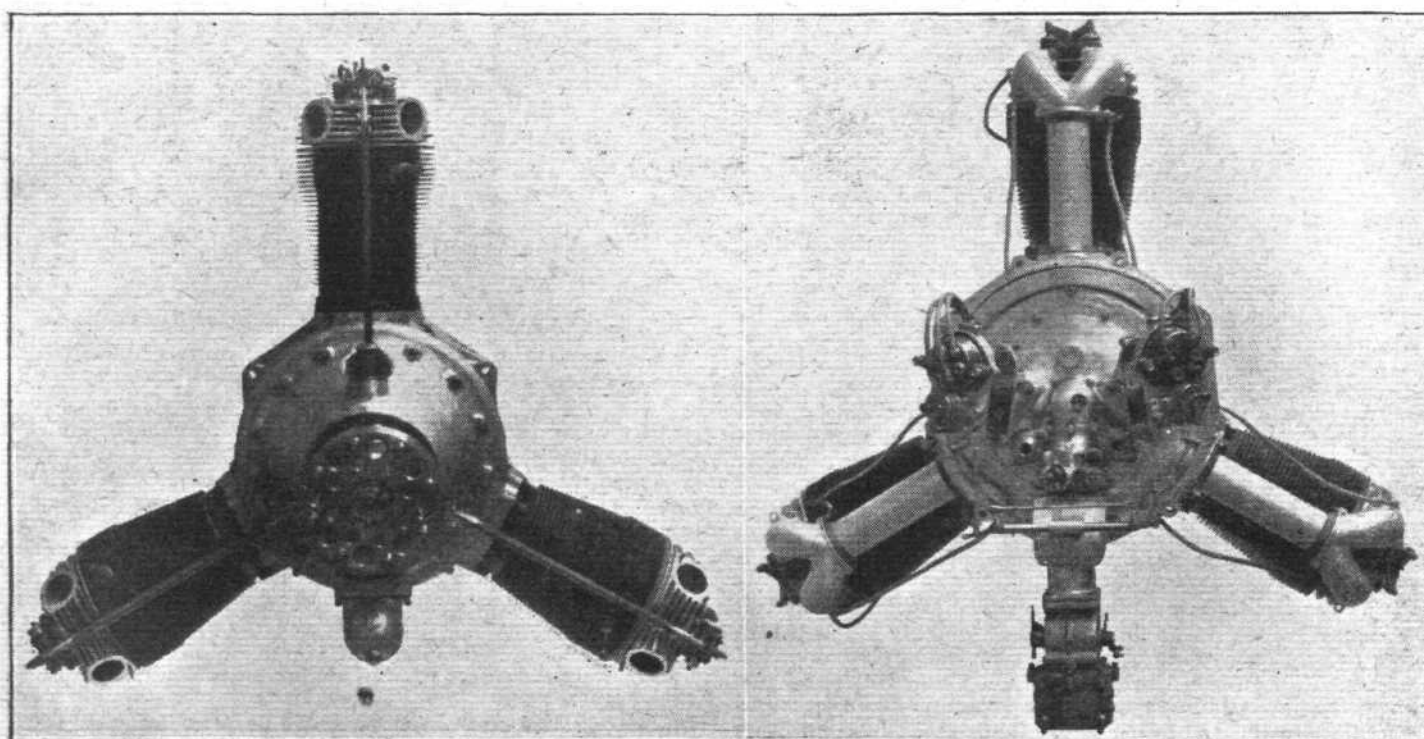
cylinders. The chamber is thus divided into three spaces, each of which is fed with mixture from one of the carburettors, and which in turn supplies three cylinders. In this way a spinning motion is imparted to the inflowing mixture which, it is claimed, prevents condensation of petrol and gives a more uniform feed.

Another interesting feature consists of an epicyclic reducing gear driving the cam-drum, operating the valves, at one-eighth crankshaft speed.

A system of sliding bob-weights is employed to ease the inertia strain of the master rod big end, and thus give an engine of



The 400 h.p. Bristol "Jupiter" aero engine.



The 100 h.p. Bristol "Lucifer" aero engine.

exceptionally smooth running qualities. In fact, the perfect balance of the "Jupiter" is one of its most important characteristics.

The oil pump is gear-driven from the rear end of the crankshaft, and is duplicated so as to scavenge all excess oil as it settles in the crankcase. It forces oil through the crankshaft to the bearings and big ends, excess oil lubricating the cylinder walls.

The principal dimensions, etc., of the "Jupiter" are:—Bore, $5\frac{1}{2}$ ins.; stroke, $7\frac{1}{2}$ ins.; b.h.p. at 1,550 r.p.m., 400; weight, 730 lbs.; petrol consumption, .594 pint per h.p. hour; oil consumption, .049 pint per h.p. hour.

The "Lucifer" is a comparatively small three-cylinder engine, suitable for training and commercial work. In several respects it possesses similar characteristics in construction to the "Jupiter," but is, of course, very much more simple in design. The cylinders are of the same bore, but the stroke is reduced to 6.025 ins.

As will be seen from the illustrations of this engine, it is of exceptionally clean appearance, the cylinders being arranged in the form of an inverted Y. There are four valves per cylinder—two inlet and two exhaust.

The main characteristics of the "Lucifer" are given in the following specification:—Bore, 5.75 ins.; stroke, 6.025 ins.; cubic capacity, 486.936 cubic ins.; compression ratio, 4.8 to 1; normal b.h.p. at 1,600 r.p.m., 100; fuel consumption, .610 pint per h.p. hour; oil consumption, .036 pint per h.p. hour; weight, 324 lbs.; weight per b.h.p., 3.24 lbs.

A feature with the Bristol engines consists of a specially designed swivelling engine-mounting, by means of which the back of the engine is easily accessible for cleaning, inspection or repairs. This engine plate is mounted on hinges on one side, so that the engine can be swung forward and outward.

Another Bristol exhibit consists of the "Bristol Gas Starter." This consists of a small air-cooled petrol engine and pumping cylinder combined. This latter supplies a combustible mixture, through suitable piping, to all the cylinders of the main engine. The whole unit is very compact, and can be placed almost anywhere on the aeroplane.

D. Napier and Son, 14, New Burlington Street, London, W. 1

THREE members of the Napier "menagerie" are on view—two "Lions" and a "Cub." The merits and successes of the Napier "Lion" are known in practically every part of the globe, and it is fairly safe to say that wherever flying is done, more or less extensively, there the "Lion" will be found. It is of interest to note that of the eight British machines at this exhibition, five of them are fitted with water-cooled engines—all of which are Napier engines, "Lions," except for the "Cub" in the Avro "Aldershot."

The 450 h.p. Napier "Lion" engine is most noteworthy perhaps, on account of the distinctive arrangement of its 12 cylinders. These are arranged in the form of an arrow-

head in three banks of four, or like a V-engine with an additional bank of cylinders in between the others.

The cylinders are steel forgings machined all over, with water jackets of steel, and detachable aluminium cylinder head, containing inlet and exhaust passages, valves and valve-actuating mechanism.

The pistons are of aluminium-alloy, fitted with two gas and two scraper rings. Gudgeon pins are of large diameter and hollow, fixed in steel bushes.

There are two inlet and two exhaust valves per cylinder, each fitted with two coil springs and operated direct by overhead camshafts driven through bevel gearing by vertical shafts from the crankshaft. The whole of the valve mechanism is enclosed within a detachable oil-tight aluminium case.

The connecting rods are machined from special high-grade steel. The master-rod, coupled to the pistons of the vertical block of cylinders, is formed with lugs on either side, to which are attached the short auxiliary rods for the pistons of the right and left groups of cylinders. The big ends are white metal-lined; anchor pins and other parts work in bushes of ample size.

Machined from a solid steel forging, the crankshaft has its four throws in one plane, and all journal bearings and crankpins are of large diameter and bored out. The shaft is carried in five substantial roller bearings and a large plain bearing at the forward end.

The airscrew shaft is carried on two roller bearings, and fitted with a large double thrust ball bearing, to take the thrust of either a "tractor" or "pusher" airscrew. Reduction between airscrew and crankshaft is through wide high-grade alloy steel spur gears.

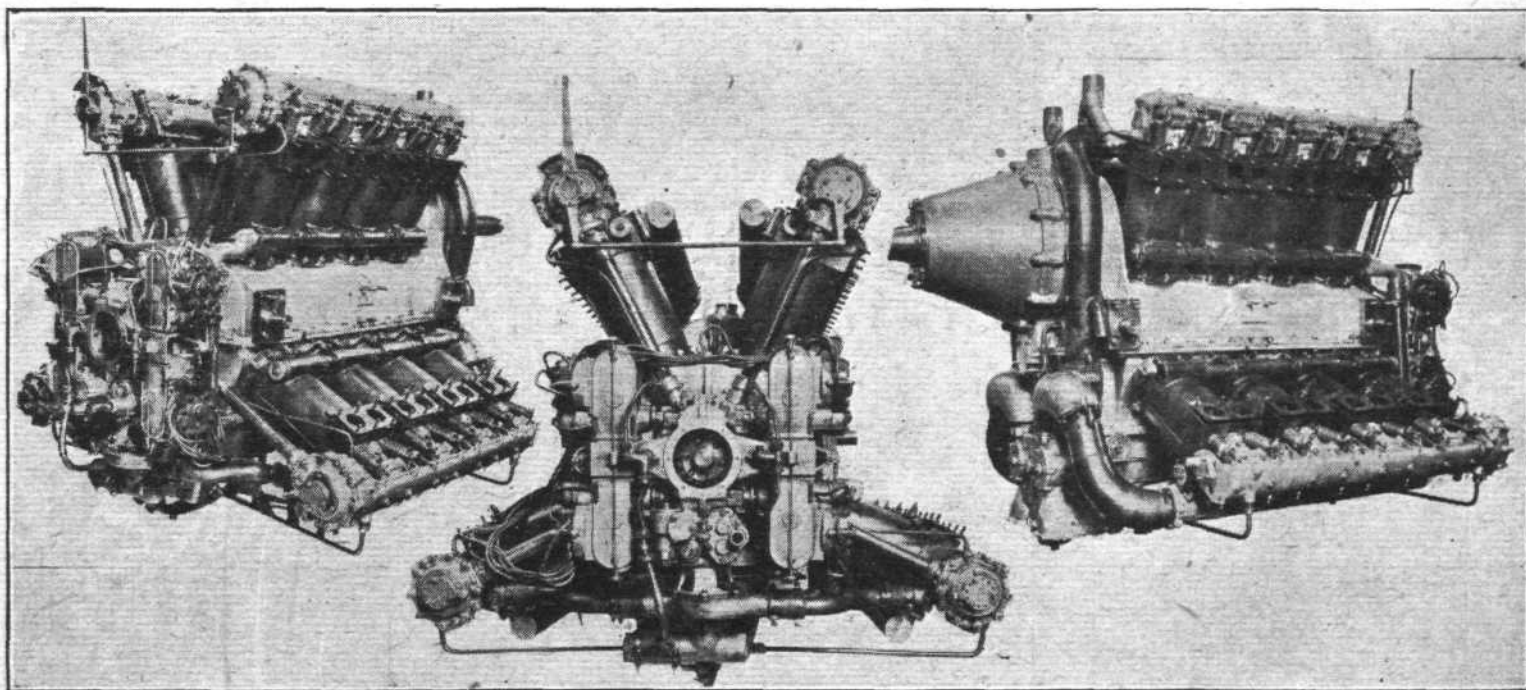
The crankcase and oil sump are of aluminium, suitably stiffened at all necessary points and having arms on either side for attachment to the fuselage. The crankcase front end encloses the reduction gear for the airscrew shaft together with the shaft and bearings. The rear end cover contains the two scavenge oil pumps, the pressure oil pump and the drive for the camshaft, magnetos, water and oil pumps.

A water pump of the centrifugal type is mounted to rear end of engine and runs at crankshaft speed. The spindle is fitted with a metallic packed gland and a screw-down greaser. Water is delivered through a separate outlet to each of the three cylinder blocks.

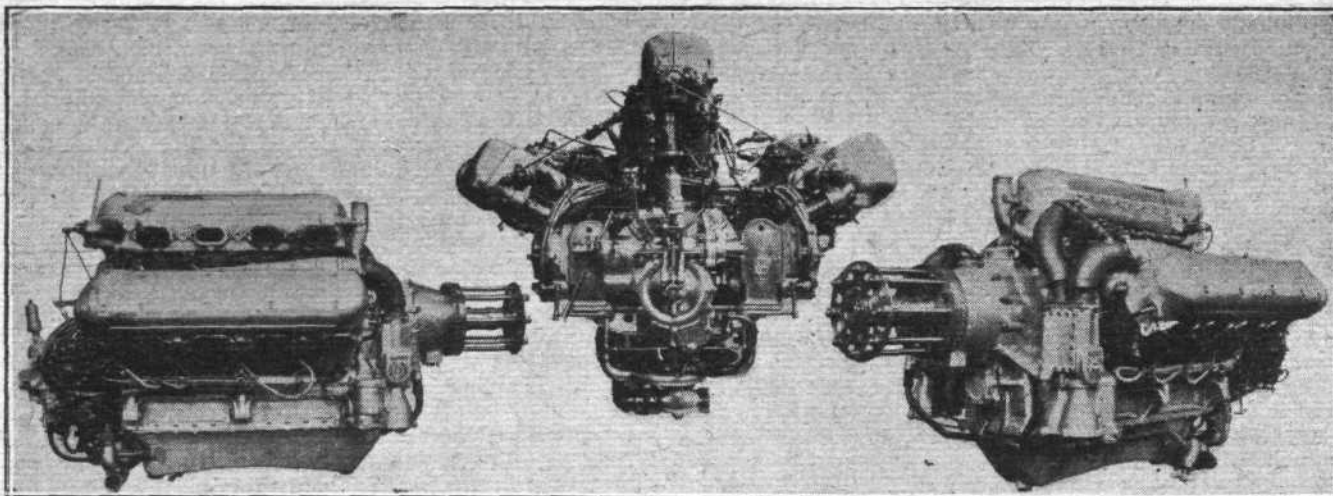
Two suction and one pressure type oil pumps are fitted, driven at half engine speed through gears. The suction pumps are connected to the sump and the pressure pump taking oil from the supply tank through a suitable filter.

There are two special 12-cylinder magnetos, mounted on platforms at the rear end of engine. Special distributors are fitted to facilitate starting by hand. The metal braided ignition cables are carried in aluminium troughs.

A twin and a single carburettor, Napier system, are fitted. The bodies, which are of aluminium and stayed to the crankcase, are water-jacketed. The gas inlet pipes to the induction on the cylinder heads are of steel, and are also water-jacketed.



Three views of the 1,000 h.p. Napier "Cub" aero engine.



Three views of the 450 h.p. Napier "Lion" aero engine.

Altitude control cocks are fitted, and are inter-connected with throttle control.

Lubrication is by pressure throughout to big ends, gudgeon pins, bearings of camshaft and forward bearing of crankshaft. The reduction gears are lubricated by oil ejected on to the teeth from a pipe connected to the crankshaft lubricating system. Valve tappets and cams are lubricated by the oil escaping from the camshaft bearings, which drains into the sump and is delivered thence to the supply tank by suction pumps. An adjustable pressure relief valve is incorporated in the system.

The Napier petrol starter is provided, by means of which fuel is pumped into the cylinders and ignited by a hand starting magneto operated through the special distributors of engine magnetos. A simple mechanism for opening the valves on each block of cylinders by hand is fitted.

The principal dimensions, etc., of the "Lion" are:—Bore and stroke, $5\frac{1}{2}$ by $5\frac{1}{2}$ ins.; normal h.p., 450 at 2,000 r.p.m. high compression ratio 5.8 to 1, and 425 at 2,000 r.p.m., low compression ratio 5 to 1; airscrew reduction, 1 to 1.52; fuel consumption, .48 lbs. per b.h.p. hour; oil consumption .028 lbs. per b.h.p.-hour; weight complete 900 lbs.; weight per h.p., 2 lbs.; length overall to centre of airscrew, 4 ft. 9 ins. width overall, 3 ft. 6 ins.; height overall, 3 ft.

The 1,000 h.p. "Cub," the most powerful aero engine in the world, was originally designed for the British Air Force and therefore many constructional details of this interesting machine are not available. A very good idea as to the general lay-out, however, may be obtained from the accompanying illustrations. It has 16 cylinders, arranged in four banks of four in cruciform, the angle between the upper two banks being about 45° , and that between the lower about 135° . This arrangement greatly simplifies installation—by no means an easy matter with large sized engines—and allows a comparatively unobstructed field of vision for the pilot when the engine is mounted in the nose of an aeroplane.

The lower portion of the crankcase is formed into a sump, and in its forward end are cast the carburettors. At the other end of the crankcase are the valve gear, magneto, and pump drives. On the upper half of the crankcase, between the top V of cylinders, is the housing for the reduction gear.

Each cylinder has four valves, operated by rocker arms from a single camshaft per bank of cylinders. The arrangement of the induction pipes may be seen on reference to the illustrations.

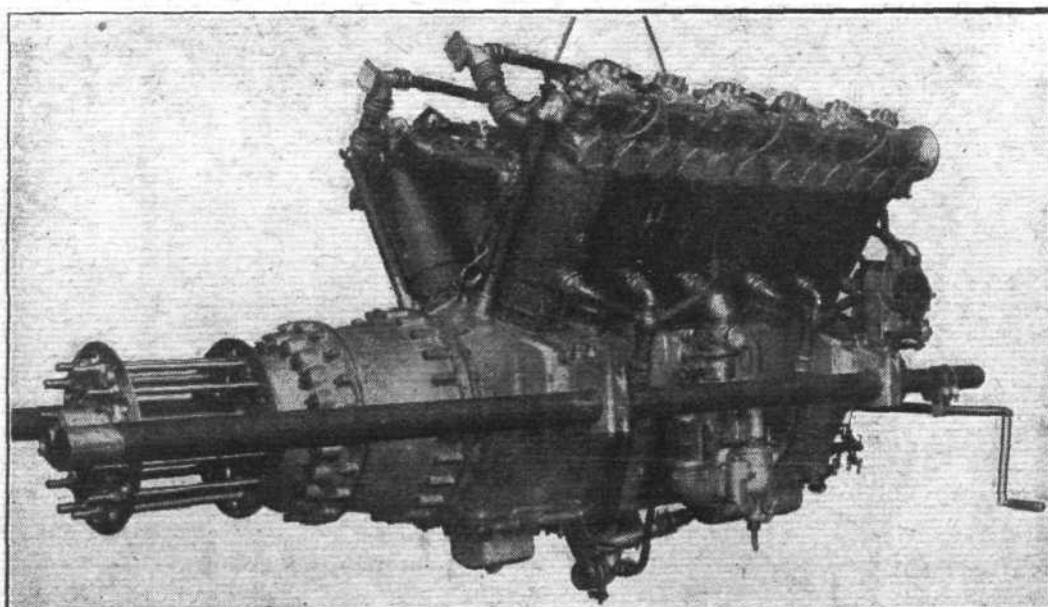
The following is a brief specification of the "Cub":—Bore, $6\frac{1}{2}$ ins.; stroke, $7\frac{1}{2}$ ins.; normal b.h.p. and speed, 1,000 b.h.p. at 1,800 r.p.m.; total swept volume of engine, 3,681.6 cubic ins.; compression ratio, 5.2—1; normal speed of propeller, 872 r.p.m.; type of gear reduction to propeller, spur gearing; lubrication, forced to all bearings; type of carburettors, quadruple carburettor cast with oil sump; mixture control, hand control; fuel consumption per hour, .5 pints per h.p. hour; ignition, four magnetos; starting, distributor provided for gas starter.

Rolls-Royce, Ltd., 14, Conduit Street, London, W. 1

OF the several successful aero engines manufactured by this famous firm, two are "featured" at the Gothenburg Exhibition. These are the 650 h.p. "Condor" and the 370 h.p. "Eagle IX." Both these engines are of the 12-cylinder, water-cooled V-type, and inasmuch as both engines are in many respects of similar design and construction, the following general remarks apply to the two types.

The "Condor" was designed just before the Armistice to meet the demand for an engine of high horse-power for carrying big loads over long distances, whilst the "Eagle IX" is a recent improvement on the famous "Eagle VIII." The cylinders, machined from carbon-steel forgings, are mounted separately on the crankcase in two rows of six at 60° . The heads are integral with the barrels, and the water jackets are die-pressed sheet steel, welded at the joints. The "Condor"

The 600 h.p.
Rolls-Royce
water-cooled
8-cylinder V aero
engine.



has two inlet and two exhaust valves per cylinder, while the "Eagle" has one of each. In the former case the valves are set diagonally, and are actuated X-fashion by four rockers converging upon two cams.

The camshafts are mounted on the top of the cylinders, enclosed in cast gun-metal cases. The gears for driving the camshafts, magnetos, etc., are driven from the rear-end of the crankshaft through a spring-controlled friction damped pinion.

The pistons are of special aluminium alloy and of the "Zephyr" type.

Five piston rings are provided, arranged as four compression rings above the gudgeon pin and one scraper ring below, at the base of the skirt. The compression rings are prevented from rotation by means of stops.

The gudgeon pins are 5 per cent. case-hardening nickel steel, hardened and ground. A special locking device is used to prevent both axial and rotational movements.

The connecting rods are H-section, of the "articulated" type, made from $3\frac{1}{2}$ per cent. steel nickel heat-treated to give a high Brinell, being machined all over to reduce weight variations. The big-end of the main rod is white-metal lined, the small end being fitted with a phosphor-bronze bush. Both ends of the articulated rod are fitted with phosphor-bronze bushes. All bearings are positively lubricated by oil under pressure.

The six-throw crankshaft is machined from a nickel-chrome steel forging, all the journals and crankpins being bored for lightness and to convey lubricating oil to all bearings and connecting rods. The crankshaft is carried in seven bearings of ample proportions.

The crankcase is of special aluminium alloy, and is made in two halves of box section, suitably ribbed to give the necessary stiffness.

The main bearings are held in the top half of the crankcase by means of nickel steel caps, these being held by long bolts which pass through the top half of the crankcase. The bearings are in halves, and consist of phosphor-bronze shells, white metal lined.

A compound epicyclic reduction gear is fitted on the front end of the crankshaft, through which is transmitted the drive to the propeller. The annulus driving gear is fixed on the flange of the crankshaft, which rotates the three sets of planet gears round the sun-wheel. The latter is the fixed member of the gear, and is prevented from rotating by means of a friction anchorage in the form of a multi-plate clutch, the plates being anchored to the casing and the sun-wheel alternately and pressed together by springs. This arrangement limits the maximum torque which may be imposed on the gears, the clutch being designed to slip if a certain torque is exceeded, due, for instance, to periodic stresses set up by propeller vibrations or pre-ignitions.

Two carburettors are provided, each supplying a group of six cylinders. They are of a special Rolls-Royce Claudel-Hobson type, fitted with needle valve adjustment, by which the flow of petrol from float chamber to jet may be regulated from the pilot's seat to suit varying altitudes.

The induction pipes are of large diameter, formed with easy bends and water jacketed adjacent to each carburettor. Suitable nozzles are fitted in each of the manifolds for priming purposes.

Four six-terminal high tension magnetos are fitted, and are supported on the auxiliary gear-case, from which they are driven by means of serrated couplings. Incorporated in the latter is a device for enabling a fine and positive adjustment of the ignition timing to be effected.

A centrifugal water circulating pump of ample capacity is fitted below the wheel-case, and driven from same through serrated couplings arranged to take care of movement due to expansion or want of alignment. In the "Condor" the pump is located in the centre of the engine.

The lubrication of the engine is arranged on the "dry sump" system, the bulk of the oil being carried in a service tank separate from the engine. The "scavenger" and "pressure" pumps are arranged as a unit, being bolted to the under side of the engine timing gear-case, and driven from the timing gear. The "scavenger" (two are fitted in the "Condor") pump draws oil through the filter at the bottom of the engine sump and delivers it to the service tank. The "pressure" pump draws oil from the service tank through a filter and delivers it to the main bearings, and other parts under suitable pressure.

An epicyclic hand starting gear is fitted on the timing gear-case. The starting handle may be arranged on either side of the engine to suit requirements, being supported from one of the engine bearers.

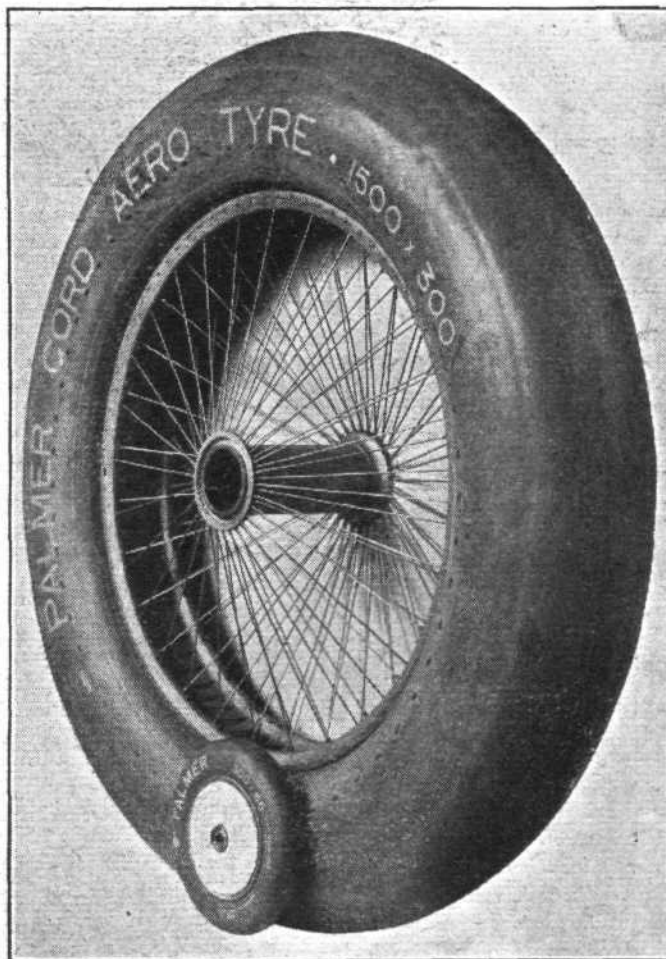
The leading dimensions, etc., of the "Condor" and "Eagle IX" are:—

	"Eagle IX."	"Condor."
Bore	4 $\frac{1}{2}$ ins.	5 $\frac{1}{2}$ ins.
Stroke	6 $\frac{1}{2}$ ins.	7 $\frac{1}{2}$ ins.
Normal b.h.p.	360	650
Normal speed (crankshaft) ..	1,800 r.p.m.	1,900 r.p.m.
maximum speed (crankshaft)	2,000 r.p.m.	2,000 r.p.m.
Normal speed (propeller) ..	1,080 r.p.m.	1,055 r.p.m.
Fuel consumption at normal b.h.p. and r.p.m. (gallons per hour)	25	45
Oil consumption (gallons per hour)	1	1.9
Weight—including reduction gear, propeller boss, exhaust pipes and screened ignition —i.e., engine complete less radiator, water and oil ..	965 lbs.	1,606 lbs.

OTHER BRITISH EXHIBITS

The Palmer Tyre, Ltd., 119-123, Shaftesbury Avenue, W.C. 2

SCARCELY a thought is ever given to the tyre on the wheels of an aeroplane, and yet one has only to watch aircraft either taking-off or landing to realise that the wheels have to withstand a tremendous buffeting. It was a problem



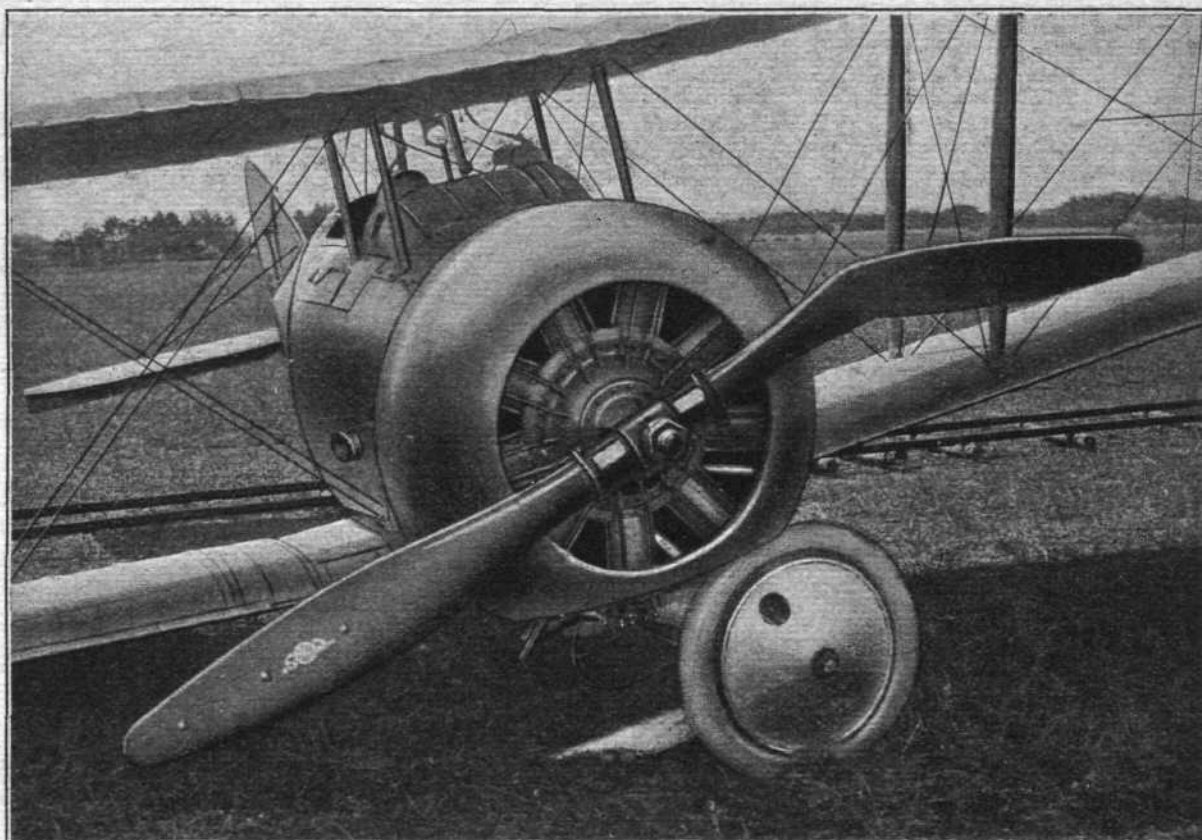
Two extremes of the famous Palmer aero wheels.

which the pioneers had to face, and that it proved to be anything but an easy one is indicated by the fact that practically only one firm stuck to the job. That was the Palmer Tyre, Ltd., and they certainly have developed the aeroplane tyre until it is as nearly perfect as would seem to be humanly possible. Not only so, but they have also turned their attention to the wheel itself and the three specimens which are to be shown will well repay detailed inspection. They will range from a 178 mm. wheel, with a 750 by 125 mm. tyre, up to a 250 mm. wheel, with a 1,250 by 250 mm. tyre, and including both central track and off-set types and the stream-line inner and outer shield and rim attachments.

Cellon (Richmond), Ltd., Petersham Road, Richmond, Surrey

AIRCRAFT without Cellon would be very much like "Hamlet" without the Prince of Denmark. Here will be

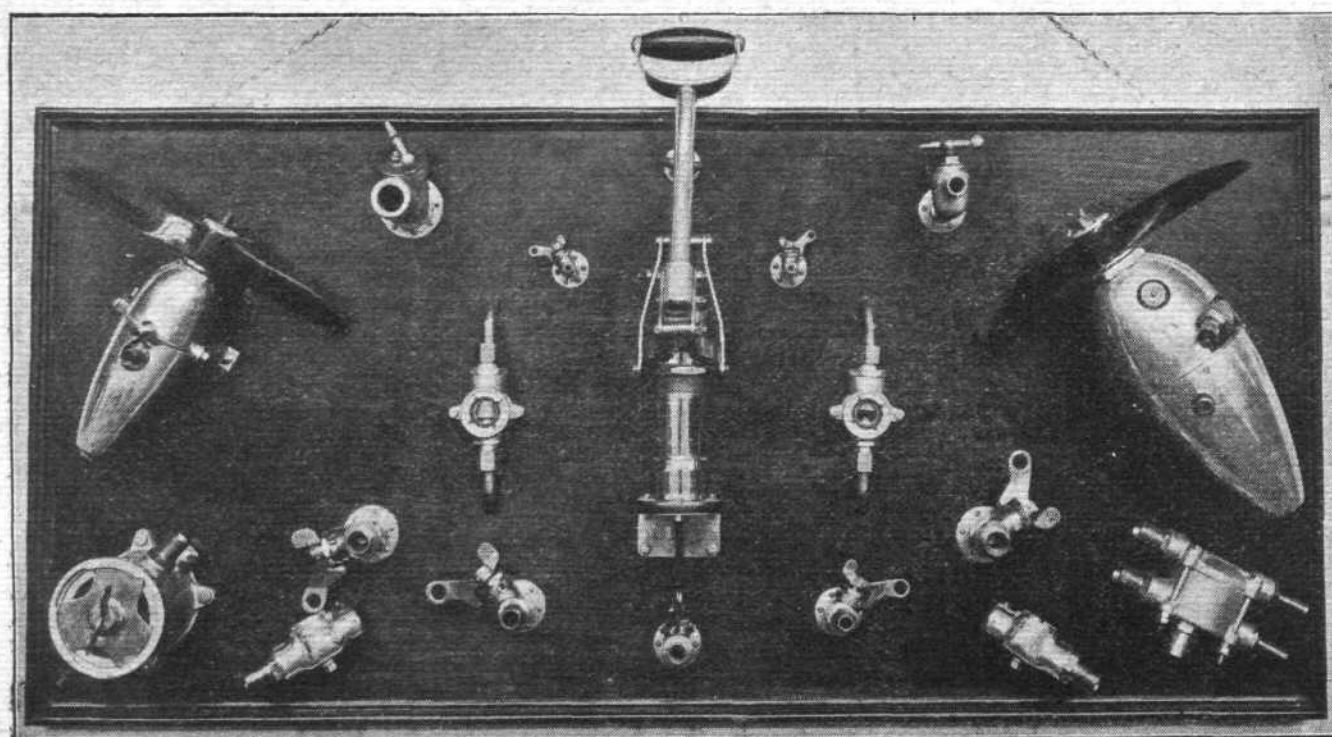
The photograph shows the effect of a "crash" (with a "Sparrowhawk" in Japan) on a Leitner-Watts metal airscrew. The bent blade, being detachable, was easily replaced.



seen a series of frames showing the results obtained with three of the special schemes of doping—"A" with the use of transparent dope followed by pigmented covering; "B" in which pigmented dope is used, so obviating the use of pigmented covering; and "X," a scheme in which both pigmented dope and also a pigmented covering are used. To those who have any concern with the constructional side of aircraft these exhibits are always most fascinating, while those who have to do with the maintenance of machines will not fail to examine another series of frames which have weathered two or three years and demonstrate that the weather has practically no effect on the doped surface. There will also be an adequate display of specimens showing the results obtained with the various Cerric solutions for use with wood and metal—a development of the Cellon Co., Ltd., which has proved successful.

Metal Airscrew Company, Ltd., Regent House, Kingsway, W.C. 2

READERS of FLIGHT are, of course, familiar with the merits claimed for the propellers which are the speciality of this firm. They will be showing one three-bladed and one two-bladed propeller, each in its way demonstrating the fine design and workmanship which the makers combine with their original method of building up the propeller. Time and again the advantages of these metal propellers have been demonstrated when machines, either by accident or through a forced landing have come down nose first; with a wooden propeller there would be little more to be done than pack up the splinters, but the metal airscrew will only bend, the welded joints still retaining their hold and preventing any more serious consequences. It is a development which has had perforce to make progress slowly, but it appears to be winning its way.



A few samples of the Vickers patent petrol accessories, fittings, etc., for aircraft (see page 415).

Vickers, Ltd., Vickers House, Broadway, Westminster, S.W. 1

THOSE who wish to study the details of aeroplane construction either as regards materials or components will have ample opportunity on this stand, while on the machine—an amphibian to which reference is made elsewhere—there will be found some most interesting instruments. There will be an instructive exhibit of specimens of steel tubes for aircraft work, an aero-engine crankshaft and other such items from the Sheffield works of the firm, while another section will show various sizes and types of R.A.F. streamline wires and aeroplane fittings complementary to which there will be a display of turnbuckles and fork ends. The importance of seeing that every precaution is taken against the leakage of petrol needs no emphasis, and so the showboard of petrol accessories, including patent petrol cocks, centrifugal and hand pumps,

oil and water cocks, filters, etc., is bound to attract a good deal of attention, the more so because most of the devices are not only beautifully made but are extremely clever in their conception. Another item which will attract the practical man will be a showcase full of high-grade engineer's small tools, many of them specially designed for aircraft work and all the production of the Vickers' works, which is a sufficient guarantee of their high quality.

Among the fittings and accessories which should not be missed may be noted a 3-in. signal gun (impulse tube), with sectioned specimens of pyrotechnic signals for use in transmission of signals to and from aircraft; the Reid control indicator, a wonderful device which tells the pilot what the machine is doing when through fog or some other cause he cannot tell what is happening, the Davis navigation lights, the Scarff ring gun-mounting, etc.

BRITAIN AS AN AIR POWER

To Be or Not To Be

In the House of Lords on July 11, Viscount Wimborne having moved: "That in view of the growing importance of air power, the contemplated expenditure in the naval and air estimates respectively is disproportionate," said that since he tabled his motion a very important pronouncement had been made in the House of Commons by the Prime Minister, which amounted to an admission of the gravamen of the case he proposed to submit. In March the Duke of Sutherland, Under-Secretary for Air, stated that there were 34 British aeroplane squadrons, as against 140 French squadrons, or 395 machines, as against 1,260 machines. The Prime Minister had said that he would welcome something like a Washington Agreement on air power. He hoped that the Government would not let that be a mere pious wish, but would do something that might lead to a limitation of air competition. He was glad to know that a policy of "Safety first" was to guide us in our defence and Imperial policy.

As long as the old Blue-water school enjoyed undisputed supremacy, so long would the growing needs of the Air Service be inadequately provided. Every one was glad to know that the defencelessness of London was to be remedied, but the defence of London was but a tardy afterthought to the grandiose conception of the naval base at Singapore. The Singapore enterprise was typical of the undisputed supremacy of the naval school. It was very arguable whether the battleship might not before long become out of date, because it might be too vulnerable to attack. Before embarking on big naval commitments, more regard should be paid to the already partial conquest of the air.

The Marquis of Linlithgow, First Lord of the Admiralty, who said he hardly thought the House would be prepared to support the resolution, made a strong speech in favour of carrying through the Singapore naval base scheme. Although he admitted the menace of the submarine, he maintained that submarine defence had so developed since the war, that it had far passed the submarine as an offensive weapon. As to battleships being obsolete, this he claimed to refute altogether. At the same time he thought Viscount Wimborne was quite right in driving home to the public the necessity for greater expenditure on the Air Force, and the Government had shown that they appreciated the air menace; but he hoped that there would be no more attempts to suggest to the public mind that air power was alternative to naval power. It was not; it was complementary. He hoped the noble lord in his splendid work for the Air Force would not think it necessary to suggest principles which were both mischievous and unfounded.

Viscount Haldane wanted to know why the Government wanted Singapore. In his view, the question of air power was much more urgent than this mistaken demand for security in the East.

Viscount Long said he was entirely with those who advocated a larger and not less efficient Air Force, but he protested against the comparisons between provisions for the Air Force and for the capital ship—Naval expenditure had got down to the bone.

Earl Birkenhead did not propose to take sides over the Singapore question, but he thought there was a case for consideration for justifying an expenditure of 10½ millions.

Lord Gorell called attention to the recent decision of His Majesty's Government to increase the Royal Air Force, and moved that whilst the House admitted the necessity for an increase in the air defences of the country, it viewed with alarm the further burden of expenditure upon armaments. In any future war, air power would not be exercised spasmodically but continuously. He asked for a definite statement from the Government that they would make unceasing effort to secure a limitation of armaments.

The Marquess of Salisbury said that Lord Gorell, like other persons, had been torn between the conflicting demands of national defence and national economy—two things which were not altogether compatible. Somewhere a line must be fixed, and they gained nothing by ignoring the difficulties in the way. Our objective must be to render this country strong enough to hold its own against the strongest air Power within striking distance, and the Government were taking the steps open to them to bring about that result. They were willing to follow on the lines of the Washington Treaty, and do their utmost to induce foreign Governments to limit their air armaments, but at present any representations would be wholly unfruitful, and would almost certainly be misunderstood.

Viscount Grey of Fallodon said at the moment the Government had no choice but to put forward a programme of increased expenditure on the Air Forces. This country was less liable to panic than other countries, but we were more liable to a state of panic arising suddenly if we were defenceless with regard to the air than with regard to any other arm. This country was peculiarly sensitive to air attack, for the reason that the vital parts of the country were more open to attack than the vital parts of Continental countries. Accordingly, he hoped notice would be taken of the fact that they regarded this expenditure as essentially defensive.

Lord Wimborne's motion was ultimately negatived and Lord Gorell's withdrawn.

PERSONALS

Married

Flight-Lieut. SYDNEY SMITH, R.A.F., was married on June 25 at Paddington Register Office, to BLANCHE LILLIAN, only daughter of Lieut.-Col. W. W. and Mrs. JAMES, of Chepstow Place, Bayswater.

To be Married

A marriage has been arranged between Capt. NIGEL BENGOUGH (late R.F.C.), of Tocknells House, near Painswick, Gloucestershire, and Wittenberg, Selborne, Addo, only surviving son of the late Mr. J. A. G. Bengough, of The Ridge, Wotton-under-Edge, Gloucestershire, and Mrs. Bengough, and ALICE, daughter of Sir GEORGE ALBU, Bart., and Lady Abu, of Northwards, Johannesburg, South Africa.

Deaths

Pilot Officer MAURICE JAMES FITZMAURICE, R.A.F., who died on July 14, at the Royal Herbert Hospital, Woolwich, aged 20, was the younger son of Rear-Admiral and Mrs. Maurice Fitzmaurice.

Capt. NORMAN ODELL VINTER (late R.A.F.), who died on July 13, at Mawcroft, Yeadon, Leeds, aged 29, was the youngest son of the late Dr. Vinter and of Mrs. Vinter, Greenroyd, Apperleybridge.

Item

Lieut.-Commander NEWTON H. WHITE, until quite recently Assistant Naval Attaché at the American Embassy, has been appointed A.D.C. (Aviation) to Admiral Coontz, the new Commander-in-Chief of the American Fleet.

TRAINING R.A.F. RESERVE PILOTS

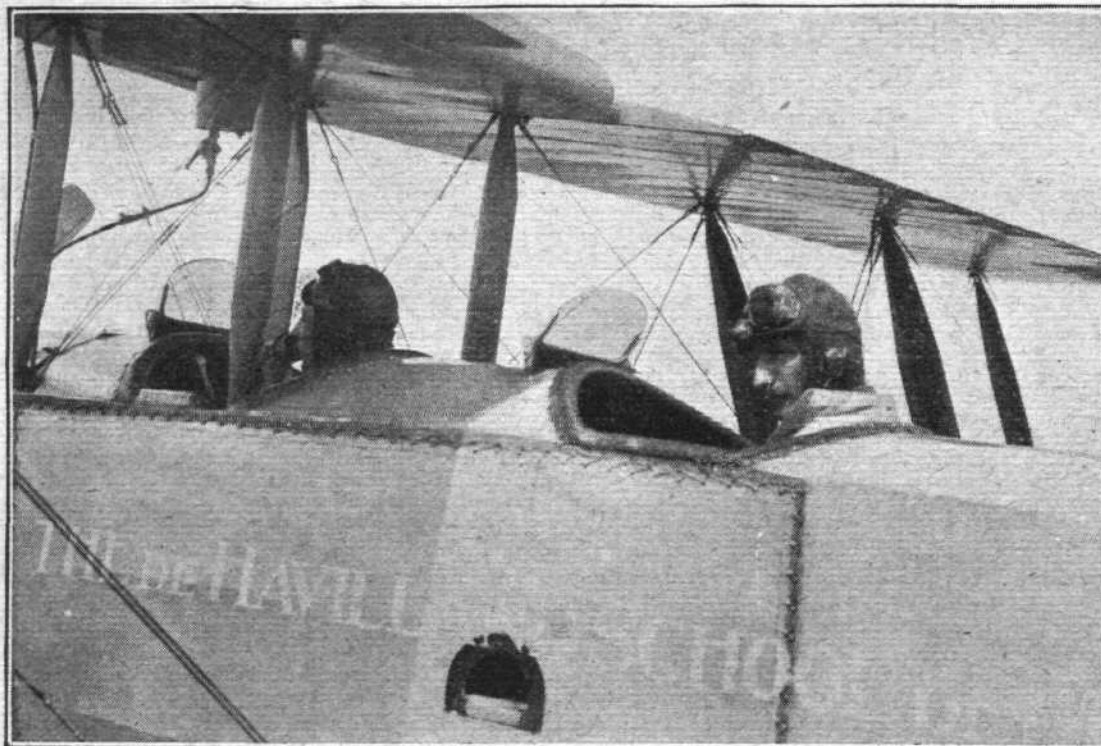
The de Havilland Flying School

It is now several months since the announcement was first made of the new arrangement whereby officers of the R.A.F. Reserve were to receive training in flying at civilian flying schools. Dividing the country into four sections for the purpose of training, four schools have been established in different parts of the country—one at Bristol, one at Coventry, one at Glasgow, and one near London. The Bristol school is being run by the Bristol Aeroplane Company, the Coventry school by Armstrong-Sideley Motors, Ltd., the Glasgow school by Wm. Beardmore and Co., and the London district

the majority of cases the pupils are officers of the R.A.F. who have passed into the Reserve at the expiration of their term of service with the R.A.F., although a few are civilian pilots who have not previously served in the R.A.F.

The "refresher course" at Stag Lane is carried out on two different types of machine. One is the well-known Avro 504 K, but fitted with 80 h.p. Renault engine. The other is the famous D.H. 9 with 230 h.p. Siddeley "Puma."

When the pupils first arrive they go through a preliminary course of dual control on the Avros, so as to become familiar



The De Havilland Flying School : Telephones are used so as to facilitate instruction. This contrasts with the old-fashioned method by which the instructor used to knock the pupil on the head to indicate that he had made a mistake.

school by the de Havilland Aircraft Company, Ltd., at Stag Lane, Edgware. The following notes deal with the latter school.

The number of pupils allotted to the de Havilland School of Flying for the present year is 80, and the course is of the type known as a "refresher course," i.e., its object is to provide further training and practice for officers who have already learned to fly, but who have had no opportunity to "keep their hands in" for some considerable period. In

with being in the air again, getting used to the machine, and becoming familiar with the aerodrome and its "approaches." After a time, when a pupil has become thoroughly used to flying again, he is sent up solo on the Avro and practices landings, starts, various evolutions in the air, and so forth.

This completes the preliminary work, and the next stage is dual control on one of the D.H. 9's. The greater speed, and particularly the higher landing speed, of the "9," with its much more powerful engine, forms a considerable change from



THE DE HAVILLAND FLYING SCHOOL : Some of the school machines in use lined up. In the foreground, the Avro-Renaults used for preliminary work, and farther back some of the D.H.9's, with "Puma" engines, on which more advanced instruction is given.

the Avro, and usually the pupil is given considerable flying with the instructor before he is allowed to go solo on this type.

The last stage in the course is reached when the pupil is sent up solo on the "9's," and if he proves sufficiently finished he is allowed to put in a good deal of solo flying on this type. This section of the course is not so much intended to teach the pupil the handling of the machine—which will have been thoroughly mastered by now—but rather to familiarise him with the instruments of a modern machine, and one of the tests which a pupil has to pass before being "passed out" of the school is a cross-country flight to some point indicated by the instructor.

This, in very brief outline, is the procedure followed at the de Havilland School of Flying, and at present the instruction is in the hands of Mr. E. B. Wilson and Mr. J. Edelsten.

The Civilian School

Apart from the R.A.F. Reserve training, the de Havilland Aircraft Co. also operate a flying school for civilians. An innovation, as compared with pre-War civilian flying schools, has been introduced in that, by paying a certain fee per hour's instruction the pupil is relieved of all liability for damage to the machine, and third party claims up to £1,000.

The same types of machines are in use as those on which the R.A.F. Reserve officers are trained, but if desired pupils with no previous experience may commence their training on the famous D.H. 6 type, which is regarded as one of the easiest

machines to fly, while its wing section is of a type which practically prevents accidental stalling, a quality which has resulted in giving it the nickname of "the clutching hand."

With regard to the fees charged by the de Havilland Flying School, these vary slightly, according to the type of machine on which it is desired to be taught. For instance, on the D.H. 6 the inclusive charge for dual control flying instruction (i.e., with instructor on board) is £6 per hour. When the pupil is flying solo this rate is reduced to £5 per hour. By paying another £3 per hour the pupil is insured against damage to machine, and against third party risk up to £1,000.

For more advanced training, or for a refresher course on the Avro-Renault, the fee is £7 per hour flying with instructor, and £6 per hour flying solo. The insurance premium is in this case £4 per hour.

Finally pupils wishing to finish off on the D.H. 9 may do so at a fee of £8 per hour dual control, and £7 per hour solo, with an insurance premium of £4 10s. per hour.

It will thus be seen that the uncertainty as to possible costs arising out of crashes has been eliminated, and that a pupil will know before he starts what is the maximum he will have to pay. He can leave the school at any time if he does not feel that he is likely to become a good pilot, or he can leave for some time and return to complete his course later. Enquiries for further particulars should be sent to the de Havilland Aircraft Company, Ltd., Stag Lane Aerodrome, Edgware, Middlesex.

LONDON TERMINAL AERODROME

Monday evening, July 16, 1923.

THE aerodrome did not escape scot-free from the violent thunderstorms which swept over the country in the early part of the week. On Tuesday evening a sudden and violent storm swept over the aerodrome from the south-east and coincided with the arrival of the Handley Page machine from Paris and an Instone D.H.34 from Cologne. The Handley Page was just in front of the storm, and managed to get down before its full fury. The Instone machine, however, which was piloted by Capt. Hinchcliffe, was caught, and eye-witnesses state that Capt. Hinchcliffe's landing, into the teeth of the storm, was one of the finest pieces of work it had been their privilege to see. The wind was so strong that it lifted the new iron corrugated roof off the Customs' examination shed and hurled it against one of the Shell petrol pumps near the arrival and departure platform, smashing the top, and giving it an extremely inebricated appearance. The anemometer at the aerodrome registered a wind-force of 52 miles an hour, and eight men, required to hold down the Handley Page after she landed, were thoroughly soaked. One of them, who was hanging on to one of the wires of the machine, received a shock which knocked him over.

Mr. Plessman, of the K.L.M., has been visiting London during the past week in connection with the combined Daimler and K.L.M. Air Line to Amsterdam and Berlin. I understand

that the K.L.M. have had so many inquiries for transport of fresh fruit from Holland to London that they are contemplating running air fruit specials in the near future from Amsterdam and Rotterdam to London.

Passenger traffic and also goods traffic keeps at a high level on all lines, and on Saturday the Instone Air Line were compelled to send three machines to accommodate the load to Cologne, while throughout the week the Daimler Airway have been so busy that it has been almost one man's work answering telephone calls and regretfully explaining that all machines are fully booked up.

A party of American tourists from Ohio, numbering nine people, booked up one of the Daimler machines to Amsterdam during the week. When they arrived at the aerodrome it was found that they had something in the neighbourhood of 600-700 lbs. of luggage in the shape of 24 large cabin trunks; and it was impossible, of course, to get the entire party and their luggage into one of the machines.

Handley Page Transport had an unfortunate accident with the original W.8, G-EAPJ, while it was flying from London to Paris with seven passengers during the week. I understand that the machine was compelled to land owing to engine trouble, and, after making a perfect landing, ran into a sunken road before it pulled up, and broke its back. Although the pilot and mechanic were thrown out of the machine, nobody was any the worse for their experience.

NOTICES TO AIRMEN

Norway : Prohibited Areas

1. Horten Prohibited Area.

An alteration having been made to the corridor along which aircraft are allowed to fly within the prohibited area of Horten, the following revised definition of the corridor should be substituted for the relative portion of paragraph 3 (Horten) of Notice to Airmen No. 70 of 1921 :—

"Flight at a maximum altitude of 200 metres is permitted above the fairway west of Bastö and east of Hortenskrakken."

The corridor running from south-east to north-west shown on the sketch map published with Notice to Airmen No. 70 of 1921 should be deleted.

2. Karljohansvern (Horten) Seaplane Station.

Aircraft proceeding to Karljohansvern (Horten) seaplane station must land in the fiord outside the islands to the north and east of the naval harbour. The seaplane station should then be approached by taxi-ing between the islands of Ostöen and Vealös or between Vealös and Möringen.

If weather conditions do not permit of landing outside the naval harbour, landing will be permitted on that part of

the harbour lying to the east and north of a line drawn from the south point of Ostöen to Trebryggen.

In these conditions aircraft flying into the harbour must not cross to the south and west of the above line, and must fly at a height of not more than 50 metres.

(No. 52 of 1923.)

South Farnborough : Obstructions

Two wireless masts, 70 ft. high, have been erected near headquarters offices in the N.E. corner of South Farnborough aerodrome.

When night flying is in progress the top of the northernmost mast is marked by a red light.

(No. 53 of 1923.)

Crystal Palace : Pyrotechnic Displays

PILOTS are warned not to mistake for aerodrome signals the pyrotechnic displays which take place at the Crystal Palace (Lat. 51° 25' N., Long. 0° 04' W.).

Croydon aerodrome bears 216° true, and is 5 miles from the Crystal Palace.

(No. 56 of 1923.)

IN PARLIAMENT

R.A.F. War Stations

Mr. STURROCK on July 2 asked the Secretary of State for Air whether, in connection with the projected expansion of the Royal Air Force, it is intended to make use of stations developed during the War and subsequently closed down?

Sir S. Hoare: The location of the new home defence squadrons is at present being carefully considered, and wherever it is more economical to do so, those War stations, which are still suited to the requirement of the Air Force, will be reopened. I am not, however, at present in a position to give particulars.

Fighting Services Expenditure

Capt. W. BENN on July 5 asked the Financial Secretary to the Treasury what was the total Vote for the Army and Navy, respectively, for the year 1913-14; and what is the total Vote proposed for the Army, Navy, and Air Force, respectively, for the financial year 1923-24.

Sir W. JOYNSON-HICKS: The net figures are as follows:—
1913-14: Army, £28,220,000; Navy (including Supplementary Estimate), £48,809,300; total, £77,029,300.
1923-24: Army, £52,000,000; Navy, £58,000,000; Air Force, £12,011,000; total, £122,011,000.

To the latter figure should be added £7,529,800 provided on the Middle Eastern Vote for troops and Air Force personnel in Iraq and Palestine.

Capt. W. Benn asked the Prime Minister whether it is intended that the additional charges involved in the proposed expansion of the Air Force shall be met by corresponding reductions in the money voted for the other services?

The Prime Minister: It is the intention of His Majesty's Government to have regard to the expenditure on national defence as a whole, and it will continue to be their earnest endeavour to effect every possible reduction of that expenditure.

Aerial Armaments

Sir G. COLLINS asked the Secretary of State for Air whether he can give for Great Britain, France, Italy, and Germany the following particulars: The number of squadrons in the Air Force and the average number of machines per squadron, distinguishing, if possible, the types of squadron; the number of civilian machines certified as airworthy; the amount of money voted for the air service in each of last three financial years for which the information is available; and the total personnel of the air service, distinguishing between flying officers and other ranks and the remainder of the personnel?

Sir S. Hoare: Under the Treaty of Versailles, Germany is prohibited from possessing an Air Force, and as regards Italy, that the whole Air Force of that country is in a process of re-organisation. I am therefore obliged to confine my answer, except so far as concerns civil aviation, to Great Britain and France. In reply to the first and fourth parts of the question, the figures for this country are as follows: Number of squadrons, 36½; number of machines per squadron, 10 to 12; the total number of officers in the Royal Air Force is 2,990, of whom by far the greater number may be classed as flying personnel; the number of airmen, 26,835. As regards France, I would refer to the answer which I gave on February 28 last and March 28 last. In reply to the second part of the question, the number of British registered aeroplanes possessing certificates of airworthiness is 100. No similar information is available as regards France, Italy or Germany. As regards the third part of the question, so far as Great Britain is concerned, I would refer the hon. and gallant member to the Air Estimates. As regards France, it is impossible to give the total figures voted on account of Air Services, as a great part of these are included in other Votes, from which it is impossible to extricate them.

Aircraft and Fatal Accidents

Mr. TILLET on July 11 asked the Secretary of State for Air what proportion of airmen are burnt to death in aeroplane accidents as against violent death by defective engines, steering, or frame construction; and what steps he proposes to take to ensure an automatic detachment of petrol tanks and protection from fire in any case of enforced landing?

Lieut.-Colonel Sir S. Hoare: The information asked for in the first part of the question is not readily available in complete detail. I can, however, give to the hon. member the following figures relating to fatal accidents to aircraft in the British Islands occurring between 1st July, 1920, and 30th June, 1923. The total number of fatal accidents was 57. The number of accidents in which death was found to be due to burning was two. The number of accidents in which fire occurred on impact was 13. As regards the latter part of the question, the Air Ministry, in conjunction with the Aeronautical Research Committee, have for some time past been giving very close attention to the investigation of various methods of preventing fire on impact. It is not at present possible to say in what direction the final solution of this extremely difficult problem may be found, but steady progress is being made, and the question of the use of detachable tanks and their location in aircraft has already been the subject of careful experiment. I shall be very glad to receive any information or suggestions which the hon. member may have to make on this subject, and should he so desire, I shall be pleased to arrange an interview for him with the Department concerned at the Air Ministry.

Viscount CURZON: Does the right hon. gentleman think it is possible to do anything to encourage the use of heavy oil engines in aeroplanes, as opposed to petrol engines?

Sir S. Hoare: I do not think that that arises here. If the noble Lord will put down a question, I will answer it.

R.A.F. Exhibitions

Mr. BECKER on July 12 asked the Secretary of State for Air whether, in view of the success of the air pageant at Hendon, he will consider the advisability of giving similar exhibitions on a modified scale in big industrial centres, especially in those areas from which he expects to recruit men for the Territorial Air Force?

Lieut.-Col. Sir Samuel Hoare: There have been various difficulties in the way of giving exhibitions such as suggested, but the question of sending a flight of machines round the industrial centres which are thought to be the most suitable is being considered.

Lieut.-Commander Kenworthy: Will the right hon. Gentleman also arrange for some dummy attacks to be made on the big industrial centres, just to bring home to the people what they are to get in the next war?

Sir S. Hoare: I must ask for notice of that question.

Mr. Becker: Is it intended to have a similar exhibition in Glasgow, so that the people of Scotland can see the effects of aerial warfare?

Air Transport

Mr. FREDERICK MARTIN asked whether, in view of the popular interest aroused by the Royal Air Force pageant, he will consider the advisability of affording to the public, and to the Members of this House, an opportunity of visiting the Croydon Aerodrome with a view to demonstrating the safety and efficiency of air transport and its value to commercial, as well as to military, services?

Sir S. Hoare: Hon. Members or others who are interested in the question of the safety and efficiency of air transport will be welcome at any time at Croydon, and if any Members of the House wish to visit the aerodrome, I shall be happy to arrange for their being shown around it. As regards a demonstration, I hesitate to ask the commercial companies who use the Croydon Aerodrome as their headquarters to undertake the expense of a special demonstration, but I suggest that the ordinary routine services of the air transport companies will themselves be the best possible evidence of their regularity and reliability.

Mr. F. Martin asked the Secretary of State for Air what regular passenger and mail air services are now available in this country?

Sir S. Hoare: Three British air services, carrying passengers and mails, are in daily operation between London and Paris; London, Brussels and Cologne; London and Amsterdam. An extension from Amsterdam to Bremen, Hamburg and Berlin is operated on two days a week by a British, and on the remaining days by a German company, but this extension does not carry mails. The only internal British service is the daily one between London and Manchester, and this also does not carry mails.

Sir F. Hall: Is there any decision yet as to the extension of the flying ground at Croydon?

Sir S. Hoare: Only to this extent, that I have included a sum in the Estimates for this extension.

Aircraft Accidents

Mr. F. MARTIN asked for the number of passengers carried to and from Croydon Aerodrome during the past twelve months; and the number of accidents, if any, which have befallen aircraft frequenting Croydon Aerodrome.

Sir S. Hoare: The number of passengers arriving at and departing from the London Terminal Aerodrome, Croydon, on regular air routes during the twelve months ended June 30, 1923, was 12,216 in British machines and 3,411 in foreign machines, or a total of 15,627. As regards accidents, by which I assume that the hon. Member means accidents involving death or personal injuries and not merely the trivial mishaps that sometimes happen on landing, etc., the answer is that no accidents of the kind have occurred to the British machines concerned during the twelve months ended June 30 last. As regards accidents to foreign aircraft, complete records are only available for accidents in this country; during the last twelve months one such accident occurred resulting in injury to the pilot.

Mr. McEntee asked whether, in view of the great increase in the number of accidents to aircraft, an inquiry can be instituted into the cause of such increase of accidents, and statistics published showing the number of accidents occurring before the introduction of the system of payment by results in aircraft manufacture; and the number of accidents occurring since the introduction of this system?

Viscount CURZON: Before the right hon. Gentleman answers that question, may I ask whether it is correct to state, in the terms of the question, that there has been an increase in the number of accidents to aircraft?

Sir S. Hoare: I will deal with that point. There has been no great increase in the number of accidents to British aircraft during the last three years, and the number of fatal accidents per flying hour for both service flying and civil flying on regular air routes has in fact decreased, despite the steady increase in the amount of flying carried out. I do not consider, therefore, that any special inquiry is necessary. With regard to the second part of the question, the information asked for is not readily available, and I have nothing to add to the answer that I gave to Mr. Hayday on July 4.

Mr. McEntee: What is meant by "no great increase"? After all, it is the figures which we want to know, whether there has been a great increase or not.

Sir S. Hoare: In view of the increased amount of flying there has been an actual decrease. I employed the expression which the hon. Member himself uses in his own question.

Sir F. Hall: Is it not the fact that the insurance companies are considering the question of a reduction in the premiums in consequence of the comparative immunity of aircraft from accidents?

Sir S. Hoare: I think that is so, and I hope my hon. and gallant Friend will use his influence to see that that reduction is carried out.

Capt. BRASS: Is the right hon. Gentleman aware of the great danger to the public and the pilots of low flying outside the aerodrome in relay races, as was practised at the recent aerial pageant at Hendon; and whether he can see his way to have regulations made whereby machines will be equipped with sealed aneroids fitted with maximum hands, so as to force pilots to attain a relatively high altitude—at least an altitude sufficiently high for them to get back in safety into the aerodrome in the event of an engine failure?

Sir S. Hoare: I am quite prepared to consider the suggestion of the hon. and gallant Gentleman. Perhaps he will send me further particulars on the subject.

French Air Estimates

Mr. LAWSON asked the Secretary of State for Air whether he can state the increased amount voted for the Air Service by the French Government since the Prime Minister's recent statement in the House to the effect that the Government had decided to strengthen our Air Service; and whether he can state the extent to which the increased amount voted by the French Government will strengthen their Air Forces?

Sir S. Hoare: Certain alterations, amounting in all to an addition of 65½ million francs, were made to the Air Section of the French Budget during the passage of the Estimates. There is no indication that this increased provision had any connection with the announcement of the British Government's Air policy made in this House on June 26. It is not possible at this stage to estimate the precise effect that this addition will have on the French Air establishments, but I understand that the greater part, about 50 million francs, is voted for the purchase of aeronautical material for the fighting services.

Capt. W. BENN: Did that figure include the provision for 50 additional naval squadrons?

Sir S. Hoare: I must ask for notice of that question. The French Estimate is very complicated, and without careful analysis it is very difficult to answer the hon. and gallant Member's question.

Aerial Armaments

Mr. LAWSON asked the Secretary of State for Air whether he can state the most recent estimate of the Air Force strength of Italy, Belgium, Germany, and America?

Sir S. Hoare: As regards Italy, Germany, and the United States of America, I would refer the hon. Member to the replies which I gave on May 3 and July 5 last to the hon. Member for Bethnal Green (Mr. Harris) and the hon. and gallant Member for Greenock (Sir G. Collins) respectively. As regards Belgium, the answer is: Number of personnel, 155 officers, of whom 72 are pilots or observers; and 2,213 other ranks, of whom 67 are pilots or observers; number of machines, exclusive of reserve, training, and headquarters machines, 153.

THE ROYAL AIR FORCE

London Gazette, July 10, 1923

General Duties Branch

Flying Officer F. W. Sinclair, D.F.C., is granted permanent commission in rank stated; March 30, 1920. (*Gazette*, March 30, 1920, appointing him to a short service commission is cancelled.) The follg. are granted short service commissions as Flying Officers, with effect from and with seniority of, the dates indicated.—I. N. C. Clarke, D.S.C.; July 3. A. I. Riley, A.F.C.; July 3. H. R. Tyler; June 28.

The follg. are granted temporary commissions in the rank stated, on seconding for four years' duty with the Royal Air Force (July 9):—

Flying Officer (Hon. Flight Lieut.).—Capt. L. S. Ingle, M.C., Indian Army.
Flying Officer.—Lieut. H. B. Holdway, Wilts Regt. Pilot Officer C. B. Horsfield to be Flying Officer: June 1.

Stores Branch

Flying Officer W. A. G. Goldsworthy is placed on half-pay, Scale B; June 25.

**Reserve of Air Force Officers
Class A.**

The follg. are granted comms. in General Duties Branch as Flying Officers on probation (July 10).—W. A. Campbell, A. E. Morgan.
Gazette of May 29 concerning the follg. are cancelled:—G. J. King, O. H. P. Lloyd.

Memorandum

Hon. Sec. Lieut. G. S. Vaughan relinquishes his hon. commn. on enlistment in the Army; Hon. Sec. Lieut. R. W. Edwards relinquishes his hon. commn. on enlistment in the Army; May 8.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

General Duties Branch

Air Commodore C. L. Lambe, C.B., C.M.G., D.S.O., to Headquarters Coastal Area. 7.7.23, for special temporary duty.

Wing Commander C. Fraser, C.M.G., O.B.E., M.C., to R.A.F. Depot, 25.6.23, on transfer to Home Estab.; to Air Ministry, 1.8.23, for duty as R.A.F. Representative on Board of Management of N.A.A.F.I.

Squadron Leaders: P. A. O. Leask, to Headquarters, Inland Area, Uxbridge. 6.7.23. R. S. Maxwell, M.C., D.F.C., to No. 32 Squadron, Kenley. 1.7.23. E. B. Beauman, to Air Ministry. 1.8.23. V. Gaskell-Blackburn, D.S.C., A.F.C., to remain at Aircraft Depot, Egypt. The notification of posting to Egyptian Group Headquarters as previously notified is cancelled. E. R. Pretymann, A.F.C., to Electrical and Wireless School, Flowerdown. 8.7.23.

Flight Lieutenants: C. N. Lowe, M.C., D.F.C., to No. 24 Sqdn., Kenley. 11.7.23. A. Rowan, to No. 24 Sqdn., Kenley. 10.7.23. G. Bowen, to R.A.F. Base, Gosport. 16.7.23. D. Cloete, M.C., A.F.C., to R.A.F. Depot, on ceasing to be seconded to South African Air Force. 2.7.23. R. Halley, D.F.C., A.F.C., to Night Flying Flight, Biggin Hill. 23.7.23. H. M. Massey, M.C., to Marine and Armament Experimental Estab., Isle of Grain. 15.7.23. E. R. Vaisey, to No. 1 School of Technical Training (Boys), Halton. 15.7.23. V. A. Albrecht, O.B.E., M.C., to No. 2 Flying Training School, Duxford. 1.7.23.

Flying Officers: E. S. Moulton-Barrett, to H.M.S. "Pegasus," Mediterranean. 6.6.23. J. B. R. Windham, to No. 2 Flying Training School, Duxford, to continue instruction in aviation. 14.7.23. E. D. Cummings, D.F.C., to No. 403 Flight, Leuchars. 25.6.23. C. L. Lowe, D.F.C., to

R.A.F. Depot, Uxbridge, on appointment to short service commission 25.6.23. H. R. Tyler to R.A.F. Depot, Uxbridge, on appointment to short service commission. 28.6.23. E. W. Logsdail, to No. 24 Sqdn., Kenley. 26.6.23. V. F. R. Hill, to No. 1 Stores Depot, Kidbrooke. 16.7.23. J. P. Caffierkey, to R.A.F. Depot, Uxbridge. 9.7.23. F. W. Boggis, to Air Ministry 16.7.23. J. F. Dewar, to R.A.F. Depot, Uxbridge (non-effective pool), on transfer to Home Establishment. 1.7.23. I. N. C. Clarke, D.S.C., and A. I. Riley, A.F.C., both to R.A.F. Depot, Uxbridge, on appointment to short service commissions. 3.7.23. S. M. Park and B. W. T. Hare, both to No. 1 Flying Training School, Netheravon. 1.7.23. R. S. Higgins, to No. 5 Flying Training School, Shotwick. 1.7.23. W. H. Stiles, to No. 24 Sqdn., Kenley. 1.7.23. H. A. Crommelin, to R.A.F. Cadet College, Cranwell. 1.7.23. F. A. Swoffer, M.B.E., to Central Flying School, Upavon. 1.7.23.

Pilot Officers: G. F. Reeves, to No. 401 Flight, Leuchars. 9.7.23. L. A. L. Firmin, to R.A.F. Cadet College, Cranwell. 1.7.23.

Stores Branch

Flying Officers (Stores): E. J. Leech, to R.A.F. Depot, Uxbridge, on transfer to Home Estab. 9.6.23. E. C. Farman, to Mechanical Transport Workshops and Pool, Palestine. 29.6.23. C. H. Masters, to No. 3 Stores Depot, Milton. 9.7.23. W. A. G. Goldsworthy, to Half Pay List. 25.6.23.

Medical Branch

Flight Lieutenants: D. LeBas, to Station Commandant, Iraq. 31.5.23. W. D. Miller, M.B., to Aircraft Depot, Iraq. 6.11.22. J. A. Quin, M.D., B.A., to C. and M. Party, Bircham Newton. 5.7.23.

Flight Lieutenant (Dental) J. H. W. Fitzgerald, to Headquarters, R.A.F., Cranwell. 16.7.23.

Birthday Honours

The following appear in the supplementary list of Birthday Honours conferred by the King, announced on June 29:—

**British Empire Order
Commander (Civil Division)**

FRANCIS GEORGE NUTT, Esq., O.B.E., Assistant Secretary, Air Ministry.

R.A.F. Team Championship

The finals of the R.A.F. Athletic team championships were held at Uxbridge on July 14. Cranwell won the King's Challenge Cup for Seniors for the third time in succession, and Calshot won the Air Council Cup for Juniors. Six points were awarded for the winning team, five for second, four for third, three for fourth, two for fifth, and one for sixth.

The totals scored in the various events were as follows:—*King's Challenge Cup*.—Cranwell (holders), 43½ points; Gosport, 28; Halton, 23½; Uxbridge, 23; Manston, 21; Henlow, 17; Flowerdown, 12.

Air Council Cup.—Calshot, 29½; Isle of Grain, 24; Spittlegate, 22½; Ruislip, 19; Upavon, 9; Shotwick, 4.

Civil Aviation: Air Ministry Annual Report

COVERING the period from April 1, 1922, to March 31, 1923, the Annual Report on the progress of civil aviation was issued last week by the Air Ministry. The half-yearly reports, of which there have been six, have been dropped in the interests of economy. Compiled on the same general lines as the half-yearly reports, the present one is divided into Part I—General and British Empire and Part II—Foreign Countries, the latter including reports upon aerial progress in the various European States, the United States, South America and one Asiatic State—Siam.

Under the British Empire section the widest information is given under various leading sub-divisions, these covering the subjects of Relations with Foreign Countries, Civil Aviation Advisory Board, Civil Air Transport Subsidies Committee, Commercial Air Services, Training of Reserve Officers, Air Navigation Regulations, Licences and Certificates, Estimates, Air Conference, Technical and Medical Services, and the Dominions, India and the Colonies. Ground organisation is again divided into Air Ports and Landing Grounds, Navigation,

Wireless Communications, Meteorology and Aeronautical Maps. A series of valuable tables cover: A. British Civil Aviation; B. Aircraft Flights and Passengers carried between Great Britain and the Continent; C. Value of Goods imported and exported by Aircraft; D. Efficiency of British Air Transport Services; E. Causes of Landings *en route* for other than Traffic Requirements and F. Accidents. The entire publication can be obtained at the Stationery Office for 9d., and we hope to return to the subject shortly, when we have had time to digest the contents.

"By Air to Everywhere"

A USEFUL little brochure, entitled "By Air to Everywhere," has just been issued by the LepAerial Bureau, of 27, Piccadilly, London, W.1—the "Air Travel Specialists." This sets forth full particulars as to times, etc., of the various air lines from and to London, together with the connecting air lines on various parts of the Continent. A copy of this time-table should be in the possession of every business house—just in the same way as "Bradshaw" or the "A.B.C." is kept as an indispensable book of reference.

Light 'Plane Grand Prix

SEVEN light 'planes competed on Sunday, July 15, at Buc, for a prize of 100,000 francs, put up by the *Petit Parisien*. This event was for machines not exceeding a weight of 250 kgs. (551 lbs.), which included 70 kgs. (154 lbs.) for pilot and 20 kgs. (44 lbs.) for fuel and oil, and the minimum distance to be covered was 300 kms. (186 miles).

Previous to Sunday's event preliminary eliminating trials were held, in which the machines had to climb to 500 metres (1,640 ft.) within 30 minutes. Of 19 entries the following passed the preliminary test and took part in the Grand Prix: Bossoutrot (Farman), Droukin (Farman), Coupet (Farman), Barbot (Dewoitine), Finat (Dewoitine), Doret (Dewoitine), Thoret (Breguet). The course was over a minimum of 30 laps of 10 kms. each. As the race progressed competitors began to drop out one by one, two of the Farmans (Bossoutrot and Droukin) and the Breguet retiring fairly early. Finat retired on the 13th round, Doret on the 19th and Barbot on the 28th. Coupet thus finished alone, and covered a distance of 310 kms. (193 miles) in 4 hrs. 47 mins. 17 secs., at an average speed of 41 m.p.h. A second prize of 20,000 francs went to Barbot.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (London Aero Models Association)

THE weight-carrying competition for the FLIGHT Challenge Cup was held at Sudbury on July 7, and proved to be an interesting event. The durations, however, were not very great, and serve to show that there is room for a good deal of experimental work in this branch of model flying. The result of the competition was as follows:—

	Weight.		Loading.		Best duration
	Area. sq.in.	Nett. oz.	Nett. oz.	Total. oz./sq.ft.	
1. S. C. Hersov	262.5	12.5	16	6.88	8.77
2. H. J. Davis	294	12	16.5	5.9	8.08
3. B. K. Johnson	250.5	13.5	16.08	7.72	9.69

After the competition some attempts were made on the glider records, and Mr. Burchell succeeded in raising the previous record of 44 secs. to 53 secs.

The "Model Engineer" Cup Competition for rubber-driven fuselage models, which was to have taken place on July 14, has been postponed in order to give members an opportunity to finish their models and to encourage the entry of non-members (full particulars from Mr. C. Bayard Turner, 21, Lanercost Road, Tulse Hill, S.W.). The new date is July 28, at 4 p.m. on Wanstead Flats, and the "D.H. Pilcher" Cup Competition will take place at the same meeting.

On Friday, July 27, there will not be any ordinary meeting at H.Q. as a Council meeting is to be held at 8 p.m.

Attention is called to the open Competition for the "Felix Kelly" Challenge Cup for compressed-air-driven models which will be held on Wimbledon Common on Saturday, August 11.

A. E. JONES, Hon. Sec.

PUBLICATIONS RECEIVED

The College Trained Engineer. By Frederic Bacon, M.A. (Cantab.). Cambridge: W. Heffer and Sons, Ltd. Price 6d. net.

Jane's All the World's Aircraft, 1923. London: Sampson Low, Marston and Co., Ltd., 100, Southwark Street, S.E. Price £2 2s. net.

Militärwissenschaftliche und Technische Mitteilungen (Fortsetzung der M.A. u. G.). May-June, 1923. Getreidemarkt 9, Vienna, VI.

The British Engineer's Home and Export Journal. Vol. V., No. 3, June, 1923. Engineering Publications, Ltd., 32, Victoria Street, London, S.W. 1. Price 1s.

A Book About Aircraft. By Ernest Protheroe. London: The Epworth Press (J. A. Sharp), 23-35, City Road, E.C. Price 2s. net.

Ships of the Royal Navy. By Oscar Parkes, O.B.E. London: Sampson Low, Marston and Co., Ltd. Price 2s. 6d. net.

The 400 h.p. "Bristol" Jupiter Radial Aircooled Aero Engine. The Bristol Aeroplane Co., Ltd., Filton House, Bristol.

Department of Overseas Trade. Report on the Industries and Commerce of Spain, March, 1923. By Capt. U. de B. Charles. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 2s. 2d. post free.

Department of Overseas Trade. Report on the Commercial and Industrial Situation in Hungary, dated March, 1923. By R. J. E. Humphreys. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 1s. 8d. post free.

Department of Overseas Trade. Report on the Economic Situation of Denmark, to March, 1923. By R. M. Turner, O.B.E. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 1s. 7d. post free.

Department of Overseas Trade. Report on Economic Conditions in Roumania, March, 1923. By A. Adams. London: H.M. Stationery Office, Kingsway, W.C. Price 2s. 1d. post free.

Department of Overseas Trade. Report on the Trade, Industry and Finance of Syria, April, 1923. By H. E. Satow, O.B.E. Price 9d. post free.

Department of Overseas Trade. Report on the Economic and Industrial Conditions in the Serb-Croat-Slovene Kingdom (Yugoslavia), dated April, 1923. By Capt. E. Murray Harvey, O.B.E., M.C. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 1s. 7d. post free.

Dominion of Canada. Report of the Air Board for the Year 1922. Canadian Air Board, Ottawa, Canada.

Aeronautical Research Committee, Reports and Memoranda: No. 801 (Ae. 55). The Pressure Distribution over a Model of the Hull of Airship R.33. By R. Jones, M.A., and A. H. Bell. March, 1922. London: H.M. Stationery Office, Kingsway, W.C. Price 1s. 7d. post free.

Aeronautical Research Committee, Reports and Memoranda. No. 813 (Ae. 64). Experiments on Rigid Airship R. 32. Part III, Measurements of Resistance and Airspeed. By J. R. Pannell, R. A. Frazer and H. Bateman. June, 1921. London: H.M. Stationery Office, Kingsway, W.C. Price 1s. 7d. post free.

Report on the Economic, Commercial and Industrial Situation of Sweden, March, 1923. By H. Kershaw, O.B.E. Price 2s. 1d. post free.

IMPORTS AND EXPORTS, 1922-1923

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January, 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; for 1921, see "FLIGHT" for January 19, 1922; and for 1922 see "FLIGHT" for January 18, 1923.

	Imports		Exports		Re-Exports	
	1922.	1923	1922.	1923.	1922	1923
Jan. ..	1,152	466	76,552	60,079	23	280
Feb. ..	567	641	69,129	120,236	1,100	3,040
Mar. ..	1,471	589	166,607	71,945	100	689
April ..	3,846	8,508	139,995	167,757	5,880	462
May ..	2,416	845	167,999	55,427	4,254	728
June ..	816	1,433	129,137	141,381	14,530	1,410
	10,268	12,482	749,419	616,825	25,887	6,609

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1922

Published July 19, 1923

- 8,835. H. BOLAS and G. G. PARNALL. Landing-gear. (199,486.)
8,898. D. J. MOONEY. Metal framework for aircraft. (199,488.)
9,285. H. W. MCKENNA. Parachutes. (199,508.)
12,390. H. E. S. HOLT. Loading of mail-bags, etc., from the ground on to aircraft. (199,555.)

APPLIED FOR IN 1923

Published July 19th, 1923

- 2,823. H. D. WOOTTON. Aeronautical cameras. (199,679)

If you require anything pertaining to aviation, study "FLIGHT's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see page xxxiv).

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

FLIGHT

The Aircraft Engineer and Airships

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
Telegraphic address: Truditur, Westcent, London.
Telephone: Gerrard 1828.

SUBSCRIPTION RATES

"FLIGHT" will be forwarded, post free, at the following rates:—

UNITED KINGDOM			ABROAD*		
	s.	d.		s.	d.
3 Months, Post Free...	7	7	3 Months, Post Free...	8	3
6 " " " " " "	15	2	6 " " " " " "	16	6
12 " " " " " "	30	4	12 " " " " " "	33	0

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates.

* European subscriptions must be remitted in British currency

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.

Should any difficulty be experienced in procuring "FLIGHT" from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.